CONTRACT

THIS AGREEMENT, made this _____ day of _____, 20_____, by and between BOARD OF SUPERVISORS OF Madison County, MS hereinafter referred to as the "**County**", and Surdex Corporation, whose principal office is at 520 Spirit of St. Louis Blvd. Chesterfield, MO 63005, hereinafter referred to as the "**Consultant**".

WITNESSETH THAT:

WHEREAS, the **County** desires to engage the **Consultant** to render certain professional services and deliver certain materials hereinafter described; and

WHEREAS, the **Consultant** represents that it is qualified, willing and able to provide the professional services and deliver the requested materials to the **County** according to the **County's** specifications and the terms of this Agreement; it is therefore agreed and understood that:

I. SCOPE OF AGREEMENT

It is the **County's** desire to have the **Consultant** perform aerial imagery and provide digital orthophotos for the entirety of Madison County. The detailed scope of work and deliverables to be provided under this contract are described within the RFP, proposal documents and selection process of the ten MS County consortium entitled MS ORTHO 2018. All of these RFP/Proposal documents are bound herein as an integral part of this **Contract** as Exhibits A-1 through A-5. These are listed below in order of priority in the event of any inconsistent or contradictory provisions:

A-1: The MS ORTHO 2018 Request for Proposals (RFP) dated September 26, 2017.
A-2: This contract document executed this_____day of_____20_____.
A-3: The **Consultant's** response to MS ORTHO 2018 technical and administrative questions associated with shortlist interview dated October 6, 2017. – *Note: There were no shortlist interview questions or answers for Exhibit A-3.*
A-4: MS ORTHO 2018 response to bidder's questions dated October 12, 2017.
A-5: The **Consultant's** proposal dated November 1, 2017.

All required tasks shall be completed in full and all required data and reports shall be delivered by the **Consultant** to the **County** no later than December 17, 2018. Digital orthophotos shall be completed by September 28, 2018 with the 60 day period until November 30, 2018 set aside for QA/QC, image corrections and project wrap-up. All documents, source documents, databases, indexes, digital images, digital data, reports, etc. collected and/or used by the **Consultant** in the development of this project shall be the exclusive property of Madison **County**, and the **Consultant** shall not distribute, sell or loan any of these materials to any other party without full disclosure and ***written consent*** of the County Board of Supervisors. All materials and data used in the Orthophotography and GIS data development and processing will be delivered back to the **County** at the project completion. It is anticipated that the total fee to be paid by the County to the Consultant for this contract will be a Firm Fixed Price of **$62,046,**

as outlined and described in contract Exhibit "C". Map accuracy shall be defined as ASPRS Class I definition (RMSE better than 1/100th of map scale).

Work shall be completed by the **Consultant** in the following summarized Phases, all of which are described in greater detail within Contract Exhibits A-2 through A-5.

A. **Phase I.** The Consultant shall acquire approximate 6-inch digital imagery of the entirety of Madison County with a raw exploitation Ground Sampling Distance (GSD) of slightly less than 6 inches using a Leica ADS100 digital sensor. Four bands (each band at 12 or 16-bit depth) shall be captured as RGB and NIR. Aerial imagery shall be captured to an extent such that all existing 1" = 100' town tax maps have full coverage and imagery capture that enables 1" = 100' Orthophoto imagery development to at least 300 feet beyond all town tax map borders. The flight plan for this imagery capture is attached as Exhibit B-2. Imagery acquisition must be completed in full prior to objectionable deciduous vegetation leafing in the 2018 flight season, and no later than March 21, 2018. Imagery acquisition shall incorporate Airborne GPS and IMU technologies.

B. **Phase II.** The **Consultant** shall provide and utilize pre-paneled or photo ID (PID) ground control points as laid out within Section 7.2.4 of the Consultant's proposal and provided herein onto contract Exhibit B-1 (flight plan).

C. **Phase III.** The **Consultant** shall perform an aero-triangulation (AT) adjustment of all blocks of digital imagery using the ground control points, ABGPS and IMU data as weighted control with a report of results provided as a brief narrative and excel spreadsheet of coordinates, elevations, residuals and statistics. Selected ground control points shall be used as blind check points with residuals calculated and reported. These check points may then be rolled into the final adjustment as primary control.

D. **Phase IV.** The **Consultant** shall develop a Digital Elevation Model (DEM) suitable to scale and precision to produce digital orthophotos at scales of 1" = 100' at ASPRS Class I accuracy from the digital imagery and AT. This DEM may be developed from existing datasets, auto-correlation from the imagery, existing LiDAR data, stereo compilation or a combination of these methods. The final DEM utilized for Orthophoto rectification shall be delivered to the **County** as an x, y, z ascii file which can be processed for point position within a geodatabase or shapefile.

E. **Phase V.** The **Consultant** shall produce and deliver a County-wide dataset of 1" = 100' digital orthophotos having a 6-inch pixel ground resolution. The 12 or 16 bit per channel four band digital imagery shall be retained through at least the initial raw exploitation image processing and color balance, with 8-bit imagery output at the end of the process for delivery to the **County**. The orthophoto imagery must be delivered as 5,000' by 5000' tiles with imagery extending at least a minimum of 800 feet beyond all county borders as described in Phase I, above. All final map data must meet ASPRS Class I accuracy standards.

II. COMMENCEMENT AND PROSECUTION OF WORK

Work done by the **Consultant** will commence immediately upon receipt of authorization to proceed, with all required contract work to be completed in full, approved and accepted by the County no later than January 7, 2019. It is expected that both parties will carry out their respective responsibilities as diligently and expeditiously as possible. However, in the event that unforeseen circumstances arise that may delay the timely completion of any part of the project, the following provisions will apply:

A. If the **County** fails to supply the **Consultant** when requested with pertinent and necessary information or materials essential for the progress or completion of any part of the project, then the **Consultant** shall be permitted to effect a temporary suspension of work and make a written request for a contract schedule extension. Whatever time is lost as a result of the **County's** delay in supplying said information or materials will become an extension of the completion date based upon the **County's** concurrence that a reasonable time extension is warranted.

B. Delays on the part of the **Consultant**, not specifically excused by force majeure, as defined below, may be excused and become an extension of the applicable completion date, if:

1. The **Consultant** has submitted in writing and in advance of the applicable completion date, a request that certain delays of work be excused by the **County**, stating therein explicit reasons which would justify such delays; and

2. The **County** responds in writing, granting to the **Consultant** approval for an extension to the applicable completion date for a specified time limit based upon the **Consultant's** request. The **County** shall have the sole authority to accept and grant, or deny, any schedule extension requests by the **Consultant** within this provision of the contract, and the **County** shall not be required to justify or defend any denial; however, the **Consultant** must provide a detailed explanation as to why the **County** should consider any schedule extension request.

C. Force Majeure: The **Consultant** shall not be liable for loss or damage due to delay in delivery resulting from any cause beyond **Consultant's** reasonable control that directly cause a project delay from or due to compliance with any regulations, order, acts, instructions or priority requests of any Federal, State or Municipal Government or any department or agency thereof, civil or military authority, acts of God, acts or omissions of the **County**, fires, floods, unusually severe weather, strikes, blackouts, unforeseen factory shutdowns, embargoes, wars, riots, delays or shortages in transportation, inability to obtain labor, manufacturing facilities or material from **Consultant's** usual sources. In the event of such delay, the **County**, upon the written request of the **Consultant**, shall equitably adjust those contractual provisions as may be affected by such a delay. The **County** shall have the sole authority to accept and grant, or deny, any schedule extension requests by the **Consultant** within this provision of the contract, and the **County** shall not be required to justify or defend any denial; however, the **Consultant** must provide a detailed explanation as to why the **County** should consider any schedule extension request.

III. WARRANTY, LIABILITY, AND STANDARD OF CARE

The **Consultant** shall perform services for the **County** in a professional manner, using that degree of care and skill ordinarily exercised by and consistent with the standards of competent Consultants practicing in the same profession or a similar locality as the project. The **Consultant** shall warrant that the delivered products meet or exceed the requirements as defined by the scope and exhibits of this contract. In the event any portion of the products or deliverables fails to comply with this warranty obligation and the **Consultant** is promptly notified in writing prior to one year after completion of such portion of the services, the **Consultant** shall promptly re-perform or correct such portion of the services at no additional cost to the **County**.

The warranty provided by the **Consultant** is based on the product conforming to mutually agreeable acceptance criteria, established by the **Consultant** and the **County** defined by

the scope and Exhibits of this contract. Regarding review and approval of products and deliverables, all reviews/data inspections are to be performed at the map scale specified for the delivered product. All image quality reviews for purposes of approval are to be performed at not greater than a 2:1 map scale of the specification for the delivered product. The **Consultant** shall not be held responsible for any anomalies or imperfections that may be apparent only at higher levels of zoom beyond a review of 2 times the designated map scale. All alignments, seams, etc. will meet the project specification. Accuracy measurements will conform to the standard as specified for the specific delivered product and conform to the mutually agreed acceptance criteria. Map accuracy requirement shall be as specified by ASPRS Class I mapping for 1" = 100' scale maps developed with a six-inch pixel. Only clearly defined points shall be used for any map scale accuracy checks. This process only applies to unambiguous measurements on clearly defined features. Radiometry/Color balancing is recognized as somewhat subjective; however, the **Consultant** warrants that the total project imagery will meet the radiometry specification agreed to within a representative land cover Pilot area to be mapped as soon as practical after imagery acquisition and before general map production.

If the **County** believes that a delivered product does not meet the project specifications, and has evaluated the product against the acceptance criteria, then the **County** may submit a request for review. A determination should be made of the specific non-compliance by checking the questionable characteristic against the acceptance criteria before submitting a claim against the warranty. Submissions should include complete information, including tile name, location within tile, nature of the problem and the relationship to the acceptance criteria. A screen shot (jpg or bmp) should be provided, if practical. If the **Consultant** agrees, then repair or replacement will occur within thirty (30) days. If the **Consultant** disagrees, the claim will be returned to the **County** with a request for mediation.

This warranty is in lieu of all other warranties. No other warranty, expressed or implied is made or intended by any proposals submitted pursuant to this Contract.

The **Consultant** will provide to the County a current Certificate of Professional Liability Insurance (E&O: errors and omissions policy for the professional services covered by this contract) to cover the tasks and deliverables of this contract, with a policy amount of at least one million dollars. This Professional Liability Insurance coverage is provided by the **Consultant** as a Professional Services Corporation to ensure the faithful and satisfactory performance of this project and is provided as one means to defend and indemnify the **County.** The **Consultant** shall also provide an Accord type certificate of insurance for all liability and workers compensation coverages, the minimum amounts of which must meet State of Mississippi standards and amounts. All referenced policies must remain in full effect for the full duration of the contract period with the E&O policy remaining in continuous effect for at least one full calendar year after the contract completion date. The E&O accord certificate shall reference the **County** as a certificate holder.

IV. PAYMENT TO CONSULTANT

A. Cash payments of the agreed upon total cost for each task of work will be made by the **County** to the **Consultant** as the work is completed and described herein within Exhibit C.

B. The **Consultant** may secure payment for a percentage or the full amount of monies allocated to tasks under each task by submitting to the **County** the following:

1. All deliverable items or evidence of work-in-progress representing that percentage or the full amount of work for which the **Consultant** is claiming payment; and

2. A dated invoice showing the amount of the claimed payment with a brief description of the work done for each separate amount being claimed. Invoices may be submitted monthly based upon work-in-progress and/or deliverables.

3. The **Consultant** shall provide a written project status report to MS ORTHO 2018 for all ten Counties of the consortium; such report shall list individually the status of progress for each **County**. Written status reports shall be submitted once every two weeks for the period of January 1st, 2018 through March 31st, 2018 and then monthly thereafter until all Counties within the MS ORTHO 2018 consortium are 100% finished, delivered and accepted. The **Consultant** shall launch and host a MS ORTHO 2018 project website upon which all status reports and other written communications shall be posted and maintained within topic oriented links or folders. Secure logins will be provided to those MS ORTHO 2018 County and Agency representatives designated by the County Assessor.

C. The **County** will make prompt payments to the **Consultant** following receipt of the items described in Paragraph IV. A and B, above, subject to formal acceptance by the **County** as complete, satisfactory and meeting all applicable specifications of all deliverable items, or evidence of work in progress, representing that percentage of the full amount required to substantiate the claimed payment.

D. The **County** shall pay within thirty (30) days all payment claims submitted by the **Consultant**, meeting all of the above requirements, and not formally disputed by the **County**. The **County** shall not use the disputation of one payment claim as a reason for disputing or not paying on time any other payment claim.

E. The **County** may impose and charge Liquidated Damages of $50 per calendar day for each day that the Consultant is late beyond the final completion date of December 17, 2018.

Liquidated damages shall be capped at a total of $10,000 (not to exceed) for this contract. As described in previous Sections II.A.B.C, the **Consultant** may request and the **County** may approve an extension of the final completion date. Any such *approved* extension will become an automatic extension in regard to initiating liquidated damages. The Liquidated Damages may be charged as actual compensation for losses and do not constitute a penalty or forfeiture. Liquidated Damages may be deducted by the **County** as an offset to invoices from the **Consultant**.

V. WORK-IN-PROGRESS INSPECTIONS

The **Consultant** shall cooperate fully with the **County** or the **County's** representatives in making possible work-in-progress inspections as frequently as desired by the **County**. In the event the **County** or its representatives reasonably find that project work is not being performed in accordance with the applicable specifications, then the **County** shall promptly notify the **Consultant** in writing of the unacceptable work, and the **Consultant** shall take immediate appropriate corrective actions.

VI. OTHER LEGAL RESPONSIBILITIES OF PARTIES

A. The **Consultant** shall observe and comply with all applicable federal, state, and local laws, ordinances and regulations during its performance under this Agreement.

B. The **Consultant** shall save harmless the **County** and its representatives from all suits, actions or claims of any kind brought on account of any injuries or damages sustained by any person or property in consequence of any act of omission or negligence by the **Consultant** or its employees or agents, or from any claims or amounts due arising or recovered under the State's Worker's Compensation laws. **Consultant's** indemnity and hold harmless obligation undertaken pursuant to this contract, if any, shall specifically exclude that portion of such obligations which could require **Consultant** to indemnify or hold harmless **County**, its agents, employees, or County Consultants for their own negligence or willful acts or omissions.

C. The **County** agrees to mitigate its damages, should any damages arise in the course of this Agreement, to every extent possible, and to take such reasonable measures to prevent injury or damages within its jurisdiction as any reasonable prudent individual or entity would take.

VII. ASSIGNMENT

This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns. Neither party shall assign its rights and/or obligations under this Agreement without the prior written consent of the other party. The RFP by MS ORTHO 2018 required respondents to identify their entire Team, including major subcontractors. The **Consultant** identified Gustin, Cothern, and Tucker as a survey sub-consultant which is herein approved in this contract.

Any additional sub-contractors that the **Consultant** chooses to use in the course of the work shall: 1) be identified in a written request to the **County** prior to use on this project by the **Consultant**. Such identification must include a basic qualifications statement as called for in the MS ORTHO 2018 original RFP with detailed contact information for the requested sub-consultant, and 2) be approved by the **County**. The **County** shall have the sole authority to accept and grant, or deny, any sub-contractor requests by the **Consultant** within this provision of the contract; however, the **County** shall not withhold such permission unreasonably for any written request that is necessary for the **Consultant** to execute the work within the project schedule or specifications. The **Consultant** must provide a detailed explanation as to why the **County** should consider any sub-consultant and approval must be provided in writing by the **County**.

VIII. PRICE ESCALATION

The unit rates contained herein shall remain in effect until September 1st 2019. In the event the **County** should cause the project to be delayed beyond September 1st 2019, then the unit rates contained herein may be adjusted to reflect any increases in the Producer Price Index (PPI). Any services provided to the **County** after September 1st 2019 may reflect the average annual PPI for the calendar year prior to when the services are actually provided. In no event may the **Consultant** adjust any unit rates to any greater amount if the performance of work occurs after September 1st 2019 and the reason the work occurred after this date is due to any cause directly created by the **Consultant**. Any increase in any unit rates shall not exceed 4% in any calendar year.

IX. WAIVER, MODIFICATION AND SEVERABILITY CLAUSE

No waiver, modification or cancellation of any term or condition of this Agreement shall be effective unless made in writing and signed by authorized representatives of each party. Nor shall any waivers be deemed to excuse the performance of any act other than those specifically referred to in said written notice of waiver. If any provisions of this Agreement shall be held to be invalid or unenforceable for any reason, the remaining provisions shall continue to be valid and enforceable, but that by limiting such provision it would become valid or enforceable, then such provision shall be deemed to be written, construed, and enforced as so limited.

X. NOTICE PROVISION

Any notice or communication pertaining to this Agreement shall be deemed to have been duly given by the parties hereto if sent to the other by common courier (i.e. FedEx, UPS) or USPS registered mail with delivery confirmation provided by signature or signed return receipt to the address hereinafter stated, or to such other address as the parties may mutually agree upon.

XI. Y. TERMINATION CLAUSE

The County may terminate this agreement for any reason or without cause upon 30 days' written notice to Consultant. Should the County choose to terminate this agreement, the County will compensate Consultant for all services performed to the date of written notification of such termination.

For the **County:**

Madison County, MS

171 Cobblestone Dr.
Madison, MS 39110

Attn: Norman Cannady
Tax Collector

Phone: 601-856-1796
Norman.Cannady@madison-co.com

For the **Consultant:**

Surdex Corporation

520 Spirit of Saint Louis Blvd.
Chesterfield, MO 63005

Attn: Cornell Rowan, CP, Project Manager
Phone: 636 368 4400
Fax: 636 368 4461
cornellr@surdex.com

Attn: Ronald C. Hoffmann, Project Principal
Phone: 636 368 4400
RonHCorp@surdex.com

The **Consultant** shall ***not*** replace either the designated Project Manager or Project Principal without a prior written request to the **County** and responding written approval from the **County**.

XII. CONSTRUCTION

This Agreement shall be construed and interpreted in accordance with the laws of the State of Mississippi, exclusive of its rules pertaining to conflict of laws.

XIII. DISPUTES

Any dispute arising under this contract which is not settled by agreement of the parties may be litigated in the courts of the state from which the contract is issued, or federal courts. Venue for any legal or equitable action hereunder shall be in Madison County, Mississippi.

XIV. ENTIRE AGREEMENT

The terms and conditions of this Agreement and any document specifically incorporated herein by reference, if any, constitute the entire Agreement between the parties. No prior communication, whether written or oral, nor any course of prior dealings between the parties shall be read into such Agreement for purposes of construction, interpretation or any other purposes whatsoever.

IN WITNESS WHEREOF, the parties have caused this instrument, consisting of pages and Exhibits A-1, A-3, A-4, A-5, B-1, B-2 and C to be executed by themselves or their duly authorized officers or agents hereunto the day and year first written above.

Board of County Supervisors

Madison County, MS	Surdex Corporation
By:_____	By:_____
Attest:	Attest:
_____	_____

Contract Exhibit C

The Consultant shall be paid a Firm Fixed Price (FFP) of $0.00 for County-wide 12-inch pixel (there is no 12" imagery being flown) for Madison County and $62,046 for 6 inch pixel (mapping of towns) for the digital orthophotography as described in the attached contract and exhibits.

This FFP has been calculated based upon the areas to be mapped at the Ground Sampling Distance (GSD) as described within the contract documents and as graphically shown on the project flight and ground control plans; Exhibit B-1 and B-2.

This FFP has been computed by defining the entire land and water body area within the boundaries of Madison County and extending a buffer distance of a minimum of 800 feet beyond all county borders. The resultant total area has been computed as 766 square miles. This minimum area to be mapped has then been multiplied by the contract unit rate for the complete service of digital orthophoto data production and delivery of $81.00 per square mile to obtain the resultant FFP of $62,046.

The Consultant shall be paid on the basis of monthly work-in-progress invoices as described by contract Section IV. Monthly invoices may be computed a work-in-progress basis using the following percentages times the FFP:

1. 40% for the aerial acquisition phase ($24,818).

2. 10% for the ground control and AT production/report phases ($6,205).

3. 40% for production and delivery of Orthoimagery ($24,818).

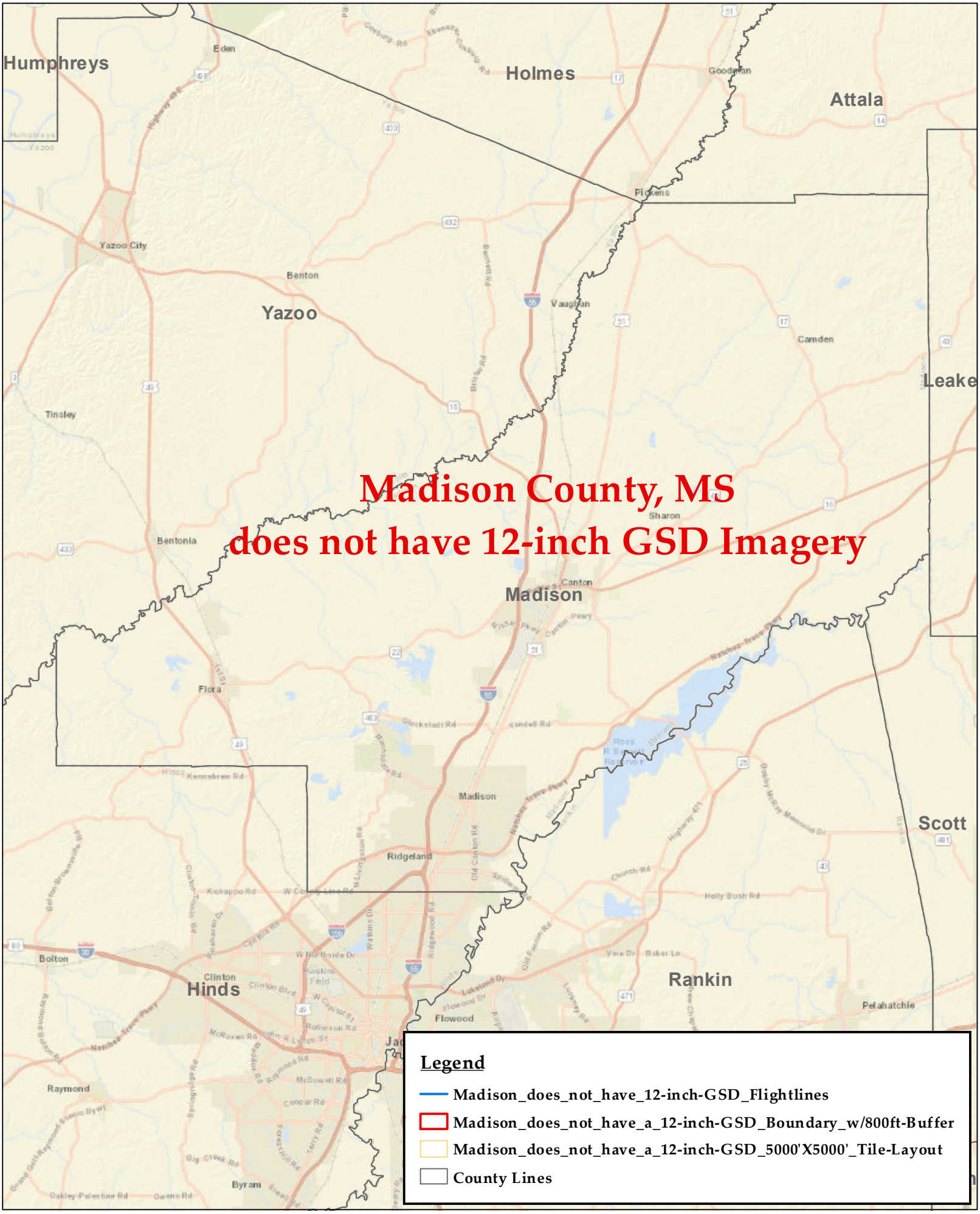
4. 10% retainage ($6,205).

The retainage (#4, above) is to be invoiced and paid as one final single payment when the entire project is 100% complete and approved by the County.

RFP Attachment G

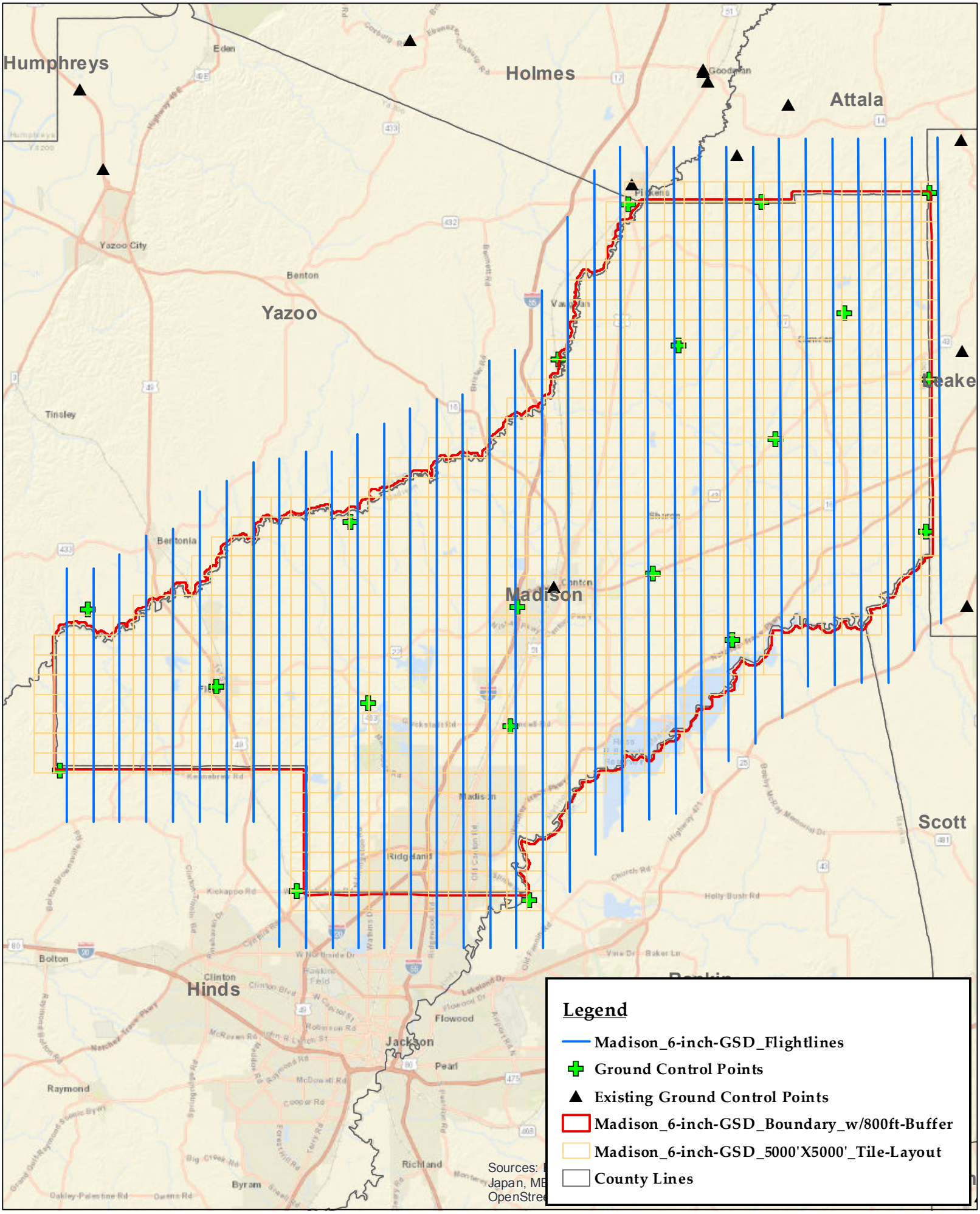
List of MS ORTHO 2018 Project Deliverables

- Contract Exhibit B-1: Flight plan with ground control layout for 12 inch imagery extent.
- Contract Exhibit B-2: Flight plan with ground control layout for 6 inch imagery extent.
- County orthophoto tile index map as shapefile to include County and Municipal boundaries and major roads and water bodies for background reference. Index map to differentiate 12 inch tiles from 6 inch tiles.
- Ground Control report as specified in section 7.2.4 of RFP. One single report covering all of MS ORTHO 2018 will be acceptable.
- Airborne GPS-IMU report as specified in section 7.2.3 of RFP.
- Signed flight logs as specified in section 7.2.2 of RFP.
- Sample raw exploitation imagery as specified section 7.2.2 of RFP.
- Aero-triangulation reports as specified in section 7.2.3 of RFP.
- DEM as specified in section 7.3.1 of RFP.
- Ortho image seamlines as shapefiles as specified in section 7.6.3 of RFP. Seamline polygons should be attributed as noted.
- Pilot project imagery as specified in section 7.3.2.4 of RFP.
- Camera/sensor calibration and/or manufacturer report of characteristics and capability as specified in section 4.3 of RFP.
- Digital orthophoto imagery tiles as specified in sections 7.3.2 and 7.6 of RFP.
- Metadata as specified in section 7.4 of RFP.
- MrSID files as specified in section 7.6 of RFP.
- Certificate of insurance as specified example contract section III.
- Certificate of errors and omissions (E&O) insurance as specified in example contract section III.
- Written status reports as specified in example contract section IV.B.3.
- Monthly invoices as specified in example contract section IV.B.



MS-2018 Ortho Exhibit B-1

Madison County, MS does not have 12-inch Resolution



MS-2018 Ortho Exhibit B-2

Madison County, MS 6-inch Resolution

MS ORTHO 2018 Aerial Photography Update Initiative 2017-2018
Request for Proposal
2018 Digital Orthophotography

1. RFP Purpose

A consortium of ten (10) Counties within Mississippi (MS ORTHO 2018) is seeking proposals from qualified firms to acquire full color (four band) digital orthophotography during the acceptable leaf off/sun angle/weather aerial photography flight season of 2018. The base specifications are six-inch pixel resolution for 1" = 100' scale and 12 inch for 1" = 200' scale mapping. MS ORTHO 2018 is a consortium of 10 local County Governments with common needs for professional services in updating GIS products used in the assessment of taxable properties. The contracts for the 2018 imagery will be an agreement between the selected provider and each of the County Governments participating. The Counties will retain ownership of their respective imagery and associated products in accordance with State law and Freedom of Information Statutes. Other State and Federal agencies may participate in ownership via Agreement. All Interlocal Agreements have been completed, executed by the appropriate County and State agencies and approved by the MS Attorney General's office. This Request for Proposal (RFP) provides an overview of the project task areas, current imagery specifications, and the information required to respond to this RFP. This RFP in no way commits MS ORTHO 2018 to contracting for services. Funding commitments from local participants may not be fully confirmed until MS ORTHO 2018 can provide actual price proposals to its partners and participants. In this regard, it is worth noting that all of the annual MS Ortho Programs from 2012 through 2017 have been fully funded by participating Counties, State and Federal agencies, and that the more than 70 Counties in those initiatives stayed with the program and met all funding, contract and Interlocal Agreement requirements. This MS ORTHO 2018 project is being managed by the same group of stakeholders and in the same manner of State/County/Federal level cooperation as the previous annual MS Ortho initiatives. Project cost is certainly a major consideration for continuance of this MS Statewide initiative; however, the qualifications, equipment capability, past experience and proposed technical solutions for producing the required products are also serious considerations for selection of a single Consultant to complete this multi-county initiative.

2. Project Overview

Title 35, Part IV, Subpart 02, Chapter 06 of the Mississippi Administrative Code, requires counties to acquire updated photography on regular intervals. These intervals are based on parcel density and overall size of the county. However, updated aerials may be tasked at any time the Tax Assessor determines the need and based on the approval of the Board of Supervisors.

2.1 **Project Area**

The total land area for the 2018 flight is currently estimated at more than 5200 square miles and includes all of the following Counties: Adams (462), Coahoma (552), Copiah (777), Lamar (497), Lawrence (431), Lincoln (586), Madison (715), Pike (409), Prentiss (415) and Quitman (405) Counties, Mississippi. Areas as shown above in parentheses are the US Census Bureau reported land area. The final area to be mapped is somewhat larger due to buffer extensions beyond individual County borders, as more accurately reflected within Attachment C (fee proposal). A State map with the participating Counties (10 in 2018) is provided as Attachment B within this RFP. This map also depicts those counties acquired in the prior year annual MS Ortho initiatives. We are reasonably

certain the extent of the acquisition area for this project (2018) will not change; however, it is possible that some jurisdictions currently planning to participate may opt out due to budget constraints. Once again, all ten (10) Counties have approved the project at the Board level through completion and execution of the Interlocal agreements. Prospective Consultants are requested to provide cost proposals on a per square - mile basis (then extended to a total cost amount, as shown within enclosed Attachment C: Fee Proposal Form) to accommodate this uncertainty. The final extent of the project will be determined after the proposal process has been completed. The square mile area to be mapped per County designated within Attachment C has been enlarged from the above presented Census Bureau land area to incorporate a typical 800-foot buffer (but up to more than one mile in some instances, as listed in footnotes) beyond each County boundary. Shapefiles are available to more adequately depict the minimum map area for each individual County.

Please note that within past annual Mississippi Ortho initiatives, several counties each year chose to acquire six-inch pixel orthophoto imagery (1" = 100' scale mapping) countywide. A majority of the counties in each year's initiative chose to acquire twelve inch orthophoto imagery (1" = 200' scale mapping) countywide, with six-inch imagery acquired only within the blocks of more urban or town areas that have traditionally been tax parcel mapped at 1" = 100'. Adams, Lamar and Madison Counties have already elected to obtain 6 inch imagery Countywide. We anticipate that the remainder of individual counties within this MS ORTHO 2018 initiative will all acquire one-foot imagery countywide with six-inch imagery within the designated town blocks. It does not appear that any of these 7 MS ORTHO 2018 counties will acquire countywide six-inch imagery; however, this may be re-evaluated once the cost proposals have been received. In order to obtain pricing for counties to evaluate this possibility, we are requesting that respondents provide a unit price for all six-inch imagery of a county having a minimum land area of at least 400 square miles. In addition, several of the counties may consider acquisition of aerial photography and production of four band orthophoto imagery with a three-inch pixel resolution to cover any larger municipalities. Therefore, in order to obtain pricing for counties to evaluate this possibility, then we are requesting that respondents provide a unit price for all three inch imagery of a contiguous municipality land area having a minimum of 4 square miles of downtown urban terrain.

3. Proposal Instructions

3.1 **Registration -** In order to receive addenda, answers to information requests, and other important communications regarding this RFP, it is imperative that you register your receipt of this RFP by sending the following information to Blake Wallace at blake@selecthinds.com.

- Name of Firm
- Address
- Contact Name
- Phone
- Fax
- Email

3.2 **Submission Instructions** - Submit one original bound copy (clearly marked original) and one digital assembled searchable Adobe PDF file of the entire proposal on a USB thumb drive in a sealed package to the following:

Mailing Address:

Blake Wallace
Hinds County Economic Development Authority
ATTN: MS ORTHO 2018
PO BOX 248
Jackson, MS 39205

Physical Address:
Blake Wallace
Hinds County Economic Development Authority
ATTN: MS ORTHO 2018
125 South Congress
Suite 1500
Jackson, MS 39201
Phone: 601.353.6056

Faxed proposals will not be considered.

The original proposal (bound copy) shall be signed by a person who is authorized to sign contracts for the respondent. The proposal shall be included as a searchable digital copy of the entire proposal in Adobe PDF format on a USB flash drive. Label the outside of the sealed package as follows:

Project Number: MS ORTHO 2018
Project Name: MS ORTHO 2018 Aerial Photography Update Initiative 2017-2018
Company: (Insert Your Company Name Here)

3.3 **Deadline** - Proposals shall be received at the location stated above no later than the Proposal Due Date shown in the Project Schedule. Proposals received after the deadline will not be accepted. Also, if the agency is closed for any reason, including but not limited to: acts of God, strikes, lockouts, riots, acts of war, epidemics, governmental regulations superimposed after the fact, fire, earthquakes, floods, or other natural disasters (the "Force Majeure Events"), which closure prevents the opening of proposals at the advertised date and time, all proposals received shall be publicly opened and only the respondent names read aloud on the next business day that the agency shall be open and at the previously advertised time. The new date and time of the proposal opening, as determined in accordance with this paragraph, shall be deemed to have knowledge of and shall have agreed to the provisions of this paragraph. Proposals shall be received by the agency until the new date and time of the proposal opening as set forth herein. The agency shall not be held responsible for the receipt of any proposal for which the delivery was attempted and failed due to the closure of the agency as a result of a Force Majeure Event. Each vendor/contractor shall be required to ensure the delivery and receipt of its proposal by the agency prior to the date and time of the proposal opening.

3.4 **Presentations and Site Visits -** The top rated (typically three) qualified respondents following the evaluation and scoring of the proposals may be invited to make a presentation in person, by teleconference or via the web. If so, MS ORTHO 2018 will notify the respondents of the date and time of the presentation. In addition, certain respondents may be asked to participate in one or more site visits by MS ORTHO 2018 representatives to investigate the respondent's ability to meet the

project requirements. All costs incurred by the respondent in the presentations or on-site visits (to Jackson, MS) shall be the responsibility of the respondent. MS ORTHO 2018 will be responsible for its staff and any travel expenses to any respondent site. After any such presentation, visits, or demonstrations, proposals may be evaluated again as an integral part of the process to select a single Consultant.

3.5 **Project Schedule** - MS ORTHO 2018 has established a tentative schedule for proposal submission, review, Consultant selection, and project initiation, as follows:

Project Schedule

- RFP Released September 26, 2017.
- Pre-Proposal meeting (not required or anticipated).
- Written questions from respondents by COB October 6, 2017.
- Written response to questions by COB October 12, 2017.
- Proposal Due Date November 1, 2017 by 4:00 PM CST
- Proposal Opening Date: November 2, 2017 (Note: Only respondent firm names will be announced at the formal proposal opening). Proposals will then be distributed and evaluated by MS ORTHO 2018 committee members.
- Oral Presentations or interviews (if required) by November 3, 2017.
- Contractor(s) Selection Approval by November 6, 2017.
- Contracts preparation and execution during November 6 – December 5, 2017
- Notice to Proceed approximately December 6, 2017
- Aerial imagery to be completed in full by March 21, 2018 (weather and leaf-bud dependent).
- Sample raw imagery files delivered for specified locations within 10 days of imagery acquisition.
- Ground control report due by April 30, 2018.
- Pilot project orthophoto imagery within two Counties (one urban, one rural) due by June 16, 2018.
- First two County orthophoto imagery complete sets due by end of July 2018, with subsequent Counties evenly staged for monthly deliveries. All ten Counties to be delivered, reviewed and approved by December 15, 2018.

Mississippi Counties operate on a Fiscal Year (FY) ending on September 30th with the new FY beginning on October 1st. As such, the County budgets must be managed to these dates. Respondents need to be aware that many of the ten Counties will need to budget and fund this project over two FY cycles; being FY 17/18 and FY 18/19, all within calendar year 2018 and probably extending several months into calendar year 2019 for those Counties that are final delivered in the October to December 2018 timeframe of the overall MS ORTHO 2018 program. It is also possible that even some of the earlier delivered Counties (July through September 2018) may negotiate to structure payments such that some portion of payment can be made within the two FY timeframes referenced.

3.6 **Proposal Acceptance and Rejection** - The Counties and MS ORTHO 2018 reserve the right to accept any proposal, to reject any or all proposals, to waive irregularities or informalities in any proposal, and to make the award in any manner deemed in the best interest of the Counties.

3.7 **Technical Approach and Quality Control** – In conjunction with qualifications and cost,

proposals will be closely evaluated on the basis of the technical approach, equipment capability and apparent effectiveness of the respondent's proposed quality control program. Delivered products will meet accuracy standards established by ASPRS (American Society of Photogrammetry and Remote Sensing), specifically ASPRS Class 1 for 1" =100' (6-inch pixel) and 1" = 200' (12 inch pixel) scale mapping. The ASPRS Accuracy Standards for Large-Scale Maps, published as white paper, March 1990 are applicable to this project, *not* the white paper published in March 21, 2014 wherein the accuracy standards have been more strictly presented. Technical photogrammetric mapping shall be accomplished and documented as to compliance by an ASPRS Certified Photogrammetrist.

3.8 **Questions -** Any questions about this RFP, deliverables, administrative or the technical procedures should be submitted in writing by email or fax by the Respondent questions deadline indicated in the Project Schedule. Requests received after this deadline will not be considered. All requests received before the deadline will be answered by MS ORTHO 2018 in an email to all registered recipients of this RFP. The requestor shall be responsible for notifying MS ORTHO 2018 of any problem in receiving replies. Email or fax questions about this RFP to:

Blake Wallace blake@selecthinds.com, Phone, 601-353-6056, Fax 601-353-7179.

4**. Selection Criteria-**The following criteria and considerations as a minimum will be used to evaluate proposals. This is not intended to be a comprehensive list, nor is the arrangement of the criteria meant to imply order of importance in the selection process.

4.1 **Compliance with RFP Instructions** - The proposals will be evaluated for compliance with instructions and specifications issued in the RFP. Noncompliance with significant instructions or specifications shall be grounds for proposal disqualification.

4.2 **Technical Expertise -** The proposal will be evaluated on the respondent's demonstrated technical suitability and qualifications for performing the project services.

4.3 **Digital Camera System** - MS ORTHO 2018 requires the use of a four band large format digital mapping camera system for this project. Properties and any calibration reports or data regarding the characteristics of the digital camera proposed shall be included as an attachment within proposals. Both frame and push-broom type cameras that meet the stated requirements will be considered. Camera calibration or manufacturer characteristic reports must be submitted and respondents should be aware that no replacement cameras will be permitted unless the Consultant first notifies MS ORTHO 2018 of intent to use any different camera than the specific ones described in the Consultant's proposal, and the Consultant is able is demonstrate and prove to the satisfaction of MS ORTHO 2018 technical evaluators that the replacement is of equal or better capability. Camera reports must be specific in regards to capture width and pixel array, simultaneous capture of red, green, blue and NIR bands, and radiometric resolution of pixel depth (bbp) for each band/channel. Proposals shall be very specific and ***clearly state the flight altitude and camera system that is proposed for each scale and/or pixel resolution of mapping. For digital sensors, this statement of flight altitude must include some basic straight forward presentation from the manufacturer of the exact raw image pixel capture of the sensor at this altitude.*** The inclusion of Airborne GPS and IMU to supplement ground control is a requirement. Completion of an aero-triangulation (AT) adjustment for each block of imagery is required along with an AT report documenting results. Proposals should be very specific and straight forward in identifying and describing any proposed

application of these technologies. Proposals may be disqualified on the basis of non-compliance to this (these) factor(s).

4.4 **Technical Approach** - The proposal will be evaluated on the methods and technical details of equipment and procedures that will be used to complete the project.

4.5 **Quality Control** - The proposal will be evaluated on the basis of the apparent effectiveness of the respondent's proposed quality control program. The proposal should outline and discuss the specific points within the production cycle at which QA tasks are completed and describe the QA work to be performed.

4.6 **Professional Registration -** The proposals will be evaluated for professional registration. The proposal Team shall include an ASPRS Certified Photogrammetrist having an integral role within project layout, design, implementation and product approval. New ground control surveys shall be performed under the direct supervision of a MS registered Professional Land Surveyor and the final ground control report shall be signed and sealed by this MS registered surveyor.

4.7 **Business Registration** - The respondent shall be licensed to do business in the State of Mississippi prior to award of the contracts.

4.8 **Firm Background** - The proposal will be evaluated on the basis of the respondent's background, including the number of years in business, capability and adequacy of resources to complete a project of this magnitude within the schedule, financial stability, quality of references, existing or recently awarded workload that might interfere substantially with the required schedules and deliverables of this project, etc. At a minimum, all of the criteria as summarized within the included Attachment D: Proposal Grading Sheet will be used to evaluate and score proposals.

4.9 **Staff Qualifications** - The proposal will be evaluated on the basis of the respondent's demonstrated staff qualifications, including the required professional registrations and certifications, background experience of photogrammetry staff members, past experience successfully managing projects of this magnitude, i.e. statewide programs, etc.

4.10 **Similar Project Experience** - The proposal will be evaluated on the basis of project experience that is of a similar technical nature, magnitude and complexity, for clients that are similar in size, location, and type as this MS ORTHO 2018 project. A minimum of ***five*** client references shall be provided with a brief summarized project specific description and current contact that is knowledgeable of the respondent's work and can be reached directly via provided email and telephone.

4.11 **Schedule and Availability** - The respondent's projected schedule and resource availability, and any major project in-house competing workload will be evaluated in the choice of a Consultant.

4.12 **Sample Digital Orthophoto** - Respondents shall submit sample digital orthophoto data with proposals from the proposed (or same type) camera system that is similar in pixel resolution, map scale and accuracy to the requirements of this project. The sample digital orthophotos may be an

important factor in evaluating the Consultant's ability to meet the requirements of the specification. Each sample data set must include an outline of the sample data project to include at a minimum: location, map scale, accuracy specification, pixel resolution, camera system, month/year date of imagery acquisition, summarized project scope and extent, and client reference and contact.

4.13 **Other Services -** Respondent may address any other services available to the MS ORTHO 2018 Counties as options and priced separately for individual County negotiations on a buy up, optional selection or as needed basis. Any such optional or recommended tasks products or deliverables should be clearly separated and identified within the proposal as such and should ***not*** be included within the basic project pricing shown on Attachment C. Optional proposals should be presented on a completely separate and clearly identified Attachment C and include an easily identified and separate technical discussion of the benefits and optional technical characteristics and procedures. MS ORTHO 2018 will not consider any optional proposals from any respondent that has not first (also) provided a basic standard proposal that meets all of the project specifications, deliverables, qualification criteria, etc. of this RFP.

4.14 **Fee** - The respondent's fee will be considered in the choice of Consultant but will not be the sole determining factor. It is anticipated that the respondent's quoted Fee will represent on the order of 25% of the total evaluation score.

5. Proposal Format

All proposals shall follow the same format. No exceptions to this format shall be accepted in that proposals will be evaluated by a committee and consistency by the process is greatly dependent upon how the proposals are formatted. To be accepted for evaluation, the proposal format shall address all required components in order. The aim of the required format is to simplify and provide structure for the proposal preparation and evaluation processes and to ensure that all proposals receive the same orderly review. All proposals shall include the Components listed in Attachment A.

6. Proposal Components

6.1 **Cover Letter** - Provide a one or two page cover letter. Include the original signed cover letter with the original proposal.

The cover letter shall provide the following:

6.1.1: A brief statement of the respondent's understanding of the project

6.1.2: The name, title, phone number, fax number, email address, and street address of the person in the respondent's organization who shall respond to questions about the proposal

6.1.3: Highlights of the respondent's qualifications and ability to perform the project services

6.2 **Section 1: Company Overview** - Provide the following information about your firm:

6.2.1: The firm's name, business address, phone number, and fax number.

6.2.2: The year the firm was established.

6.2.3: Former names of the firm, if applicable.

6.2.4: The type of ownership and parent company, if applicable.

6.2.5: The location of the office or offices that would provide the project services.

6.2.6: A brief statement of the firm's background, demonstrating longevity and financial stability

6.2.7: A discussion of any offshore services that are included within the proposal to include location, name and ownership of any offshore service provider, any past track record or projects completed by a Team of the referenced offshore service provider and the respondent, etc. **MS ORTHO 2018 is not requiring the exclusive use of on-shore capability; however*, it is a requirement to identify* within proposals any planned use of offshore services and be specific within proposals of the exact technical tasks which are to be performed by offshore providers. In this regard, it is a proposal requirement to specifically state if offshore services *will not be used*, or if offshore services *will be used*. Failure to provide a clear statement of intended use, or non-use of offshore services may be grounds for disqualification of any proposal.**

6.3 **Section 2: Project Services** - In this section, which is intended to be the technical presentation of the proposal, describe the respondent's expertise with the methods, QA/QC procedures, hardware and software necessary to perform the project services described in Part 7 of this RFP. This section should include technical information about the proposed sensors, ground control layout, proposed flight plan, GPS-IMU equipment and procedures, AT procedures, DEM/DTM source/compilation, accuracy statement, discussion of orthophoto processing, radiometry, etc. Include information about the respondent's quality control steps, tasks and program.

6.4 **Section 3: Project Team** - Provide detailed background for the designated project manager and the key individuals within the project production team. The selection criteria in Part 4 require the proposed team to include an ASPRS Certified Photogrammetrist. Include a project team organization chart and resumes for key individuals.

6.5 **Section 4: Related Experience** - For up to five (5) relevant projects, include a one or two page project description that demonstrates similar capabilities in similar projects, for local government, state or federal clients. Project description should include scope of services, map scale, sensor utilized, pixel resolution, general description of project size, year of imagery acquisition and project current status. Include the name of the client organization, the name of the person who can be contacted for reference, and the specific contact information for that person. Please try to provide both phone and email contact information for a current contact at the client location that is familiar with the project and can discuss contract performance and deliverables.

6.6 **Section 5: Proposed Schedule** - Include a brief schedule for the completion of the project services and the deliverables (identified herein as Attachment G) of your proposal. Include the proposed project start and end dates. Describe your projected resource availability for the anticipated duration of the project.

6.7 **Section 6: Fee** - Complete "Attachment C" (the Fee Proposal Form).

6.8 **Section 7: Sample Orthophoto** - Provide a minimum of two different sample digital orthophotos on a USB flash drive. The samples shall be similar to this RFP's criteria for six and twelve-inch imagery of developed/urban areas as well as rural areas having small villages, farmsteads, secondary roads, farm fields and forests, etc. The samples must have been created by the respondent company as prime consultant with the same basic type of camera system and processes you are proposing for this project. The digital orthophoto samples shall be in uncompressed, ortho-rectified GeoTIFF format. The samples shall be representative of the requirements for orthophotos as specified by this MS ORTHO 2018 project. This sample imagery is to be submitted solely as an example of the respondent's product and does not imply any alteration of specification or deliverable, or acceptance by MS ORTHO 2018 of any other specification or radiometric processing for this project.

6.9 **Section 8: Additional Information** - At your discretion, include additional information or expanded documents such as a more descriptive Team equipment list, sensor calibration report backup reports or publications, additional references, optional proposals and other information that supports and enhances a better understanding of your proposal.

7. Technical Specifications

7.1 **Existing Conditions -** Each County will provide the following data which will be made available to the ***selected Consultant***.

7.1.1 Existing tax map layout to include any specified Urban Growth Area boundaries and City Limits for 1" = 100' scale mapping with 6-inch pixel resolution. Note: Unless a County is specified as six inch countywide (see Attachment C table), then all existing tax map areas that may be shown as 1" = 400' maps are to be acquired as 1" = 200' scale maps with a 12-inch pixel within this program. ***Existing tax map indexes that have been extended to include required Buffer" areas for all ten Counties of the MS ORTHO 2018 consortium are provided as shapefiles for download as attachments to this RFP.*** The intent is that these files can provide a base for flight and ground control planning, costing and presentation by respondents.

7.1.2 Project Area Boundaries for each County and the specified Urban areas.

7.1.3 Public Land Survey System (PLSS) – Will include Township, Range and Sections for each County; specified Urban areas may also include quarter section lines.

7.1.4 All files will be made available in ESRI shapefile format.

7.1.5 Any additional available GIS files that would assist layout and design of this project and may not be listed above.

The ***successful Consultant***, acting under the authority and approval of the MS ORTHO 2018 consortium Counties, shall be expected to provide in a timely, clear and concise manner any desired additions, alterations or changes to the attached boilerplate example contract (example presented as used within prior year MS Ortho projects), which is provided as Attachment F to this RFP.

7.2 **General Requirements**

7.2.1 **Datum, Projection and Accuracy**

The final digital orthophotography will reference the Mississippi State Plane Coordinate System NAD83 (2011) for all Counties. Please note that Mississippi has an east and a west zone, as shown on Attachment E. Consultants are responsible for verifying the correct Mississippi State Plane Coordinate System NAD83 designation for each County. Digital orthophotography shall be developed to meet a minimum map accuracy standard of ASPRS Class I, as described within the March 1990 white paper.

7.2.2 **Aerial Acquisition**

Four band (R, G, B, NIR) digital orthophotography will be developed for the areas prescribed in Attachment C at a scale of 1 inch = 200 foot with a 12-inch Ground Sample Distance (GSD or pixel resolution) and a scale of 1 inch = 100 foot with a six inch GSD for the town areas designated within the attached County index map shapefiles. Note that Adams, Lamar and Madison Counties have elected to acquire 6 inch pixel resolution imagery Countywide. It is possible that some Counties currently designated for combination of 12 and 6-inch imagery may opt for Countywide 6-inch imagery, based upon costing relative to budgets. In this regard, respondents are asked to provide a single unit price for a theoretical plus 400 square-mile (see Attachment C) County to be mapped at six-inch pixel countywide. Three-inch pixel resolution may be required for the urban developed centers of several larger municipalities. In this regard, respondents are asked to provide a single unit price for a theoretical plus 4 square-mile (see Attachment C) municipality to be mapped at three inch pixel.

Aerial acquisition will occur during periods when the deciduous foliage is dormant and the prevailing sun angle exceeds 30 degrees. Deciduous leaf-on imagery will be rejected and the Consultant is responsible for all costs associated with any re-flights. Further, the Consultant is responsible to acquire all imagery within the winter 2018 flight season, to include timely internal QA/QC processes to find any unacceptable imagery of flight lines or exposures and then acquire re-flight imagery also within the same 2018 flight season.

Final orthophoto products will be free of cloud cover or cloud shadows and will be free of objectionable haze and smoke. It is recognized that isolated small trash ground fires may occur and may be accepted so long as small trails of translucent smoke do not obscure desired map features such as buildings, roads, bridges, etc. Re-flights will be required of any areas that have larger ground fires such as forest fires, large-area burning of fields that obscure ground features, etc. Rivers and streams must be below flood stage, within normal banks and water shall not cover desired map features such as roads, fields or be excessive within forested areas that are not generally within standing water seasonally during imagery acquisition. The Consultant shall communicate/discuss with the County staff person designated by the County Assessor regarding acceptable water levels *prior to* imagery

acquisition within the Mississippi River floodplain for those two Counties that directly border the river (Adams and Coahoma). It is recognized by MS ORTHO that multiple flight seasons are sometimes required for imagery acquisition behind and adjacent to the river levy should the river be at excessive levels for significant portions of the flight season. This shall not preclude acquisition of imagery flight lines for areas not affected by the river flooding and having acceptable ground conditions within these Counties.

Imagery will be acquired using a high resolution large format digital mapping camera/sensor. Data and specifications for the camera/sensor will be provided in the respondent's proposal as well as sample orthophoto imagery that was acquired with this sensor or one of like model and manufacture. Imagery will be collected in conjunction with Airborne GPS and IMU data. The technical proposal shall be specific in terms of how the airborne GPS will be acquired and processed (single station solution, multiple station solution, virtual station, NGS CORS as base station, vendor GPS surveyed and occupied base station, etc.) Appropriate photo-identifiable or paneled ground control will be acquired to support the aero-triangulation and orthorectification processes. Imagery will be collected in natural color of four bands (R, G, B, NIR) for true color rendition of final orthophotography. Please note that for any given final delivered pixel resolution, the imagery acquisition by a digital sensor must be predominantly smaller or equal for the base proposal. That is, re-sampling of data from a larger acquired pixel to a smaller pixel as a general process for delivery is not an allowed process for submittal of the base proposal and the vast predominance of imagery must be collected at the required resolution or finer.

Please note that a flight plan (with flight lines) with inclusion of a ground control layout is a required submittal with the proposal. This can be provided as a scalable hardcopy plot showing at a minimum County and municipal boundaries with mapping limits of 1" = 200' (12 inch pixel) and 1'=100' (6 inch pixel) also plotted. The source of ground control locations (existing monuments versus new GPS surveys) shall also be designated on the Flight-Ground Control plan. Flight and ground control plans may also be provided as shapefiles that are stored within named folders on the USB flash drive that is included with sample imagery, or on the media with the pdf copy of the proposal.

For each flight sortie (mission), the pilot or cameraman shall prepare a signed flight log containing the date, project name, aircraft used, time interval for each flight line, altitude, sensor model and serial number, names of crew members and any other comments and observations relative to the flight and weather conditions such as smoke and ground fires, wind turbulence, streams outside of apparent banks, etc. Copies of flight logs shall be provided to MS ORTHO 2018 for *all imagery acquisition and sorties* prior to the end of flight season.

Sample raw exploitation imagery must be provided by the Consultant to MS ORTHO 2018 for each County project within approximately ten days of imagery acquisition. The general layout shall involve at least six images of 20% endlap (every other frame from standard 60% acquisition), with two images from each of two adjacent flight lines, picking exposures that sidelap (minimum 30%) between the two flight lines. These raw images should include position files developed from the Airborne GPS-IMU EO data that enable the user to at least display the images within an approximate position and rotation within ArcGIS. Each County project should include at least two such sets of raw imagery from the county-wide set (12 inch for some counties and 6-inch for others), with one set near the center of the County where features such as structures, roads, farms, streams, etc. might exist, and one of the sets

from rural areas having both cultivated fields and forest. Note: one such single "set" of raw exploitation imagery can be applicable for delivery only once where multiple adjoining Counties of the MS ORTHO 2018 consortium adjoin. That is, one such set may be used as a deliverable for multiple Counties at an approximate corner where multiple counties of this MS ORTHO 2018 Consortium meet. Sample raw exploitation imagery must also be provided for the 6-inch town blocks that are mapped within those counties having a countywide 12-inch pixel. One raw exploitation image shall be provided covering a portion of the central town or most heavily developed areas. One such image shall be provided for each town block for Counties having three or less town blocks, or three such sets in total for those counties having more than three town blocks. Note: should respondents utilize a pushbroom type sensor, then the above described raw imagery samples may be provided as imagery over approximate equivalent areas and geometry as that described herein for frame image sensors.
The raw imagery deliverable is required strictly for the purpose of allowing MS ORTHO 2018 members to review the quality and radiometry of the raw imagery early within the program and also to provide a base level comparison of raw imagery and captured detail relative to that shown in subsequent delivery of pilot project and final orthophotography.

7.2.2.1 **Re-flights** - The Consultant at no additional fee shall correct aerial imagery that does not meet defined project specifications. All re-flights shall be centered on the plotted flight lines and shall be taken with the same camera system whenever possible.

7.2.2.2 **Crab** - Crab shall not exceed five-degrees between any two consecutive flights, nor more than three degrees on any one flight line. At the earliest opportunity, new imagery shall be acquired to replace rejected photographs or flight lines.

7.2.2.3 **Forward and Side Overlap** - Forward lap shall average a minimum of 60 percent and side lap shall average a minimum of 30 percent. Any adjacent flights with side lap of consistently less than 25 percent may be rejected, and the affected flights shall be re-flown at the earliest opportunity.

All MS Counties within this years' program (MS 2018) have previously been mapped by orthophotography, many of which were accomplished with film cameras or earlier generations of digital sensors. This equipment, in general, acquired smaller image exposure footprints than the predominantly now-used digital sensors having very large footprints (exposure sensors), or swaths (push-broom sensors). As a general rule, the acquisition geometry (combined factors of footprint size and flight altitude) of these earlier cameras and sensors resulted in less apparent "building lean' on the extreme edges of acquired imagery than is noted within imagery acquired within some of the more recent very large footprint digital sensors. ***Respondents are encouraged to provide a discussion within the Technical Presentation section of their proposal (section 2: Project Services) of the geometric characteristics of their proposed sensors (footprint, altitude, sidelap, etc.) and attendant flight plan, and how that affects extreme edge apparent elevated building lean compared to that which users of the imagery may have become accustomed from earlier technologies or prior completed, more traditional orthophoto base mapping projects. The discussion should include any flight plan or specific equipment related characteristics that are included within their proposal to mitigate extreme edge building lean that might be found as objectionable by the user community of the final orthophoto imagery.***

7.2.3 **Airborne GPS-IMU:**

The use of airborne GPS and IMU technology during imagery acquisition is required for this MS ORTHO 2018 project. Respondents shall describe the processes and equipment to be utilized for this process. A brief narrative report of procedures, equipment and results shall be provided for each larger block of contiguous imagery divided by AT block or County boundaries with an excel spreadsheet for each sortie that includes at a minimum the following data fields: date, sortie number, sensor ID, aircraft tail number, planned altitude, flight line number, exposure number, easting, northing, ortho-height, Omega, Phi and Kappa as well as standard deviation calculations for these positions and attitudes. The report narrative should briefly describe how the Airborne GPS was post processed and describe any difficulties that were encountered that required re-flights.

7.2.4 **Ground Control**:

Sufficient horizontal and, if applicable, vertical control surveys shall be established by the Consultant for all photogrammetric mapping purposes, particularly in regards to meeting the final map data accuracy requirements, taking fully into account the use of Airborne GPS and IMU technology within the aerial acquisition task and aero-triangulation within the mapping task. The technical proposal shall include a description of ground control methods, sources and quantities that are proposed for this project. Any new ground control surveys must be reported as a control diagram that also describes GPS survey methods, occupation times, method of coordinate computation (RTN, OPUS, etc.) and PDOP and statement of precision based upon RMSE calculations. Permanent monumentation of new ground control surveys is not required for this project. A ground control report is a required submittal and must include:

- A narrative discussion of procedures and results
- A list (excel spreadsheet) of all ground control points to be utilized in AT, including at a minimum fields for point name/number, date of survey, final adjusted MS SP coordinates, elevation, type of location (PID or panel), type of coordinate computation (RTN, OPUS, post process), base station used for differential correction, date of OPUS or post processing, copy of OPUS reports, time interval of occupation (start and end times), PDOP information, GPS receiver model, and crew names.
- Each ground control location shall include a map or sketch and description of location (data sheet) and at least two ground level pictures of the location that are suitable for reliably finding and measuring the survey point within the raw exploitation and final orthophoto imagery.

7.2.5 **Analytical Aero-triangulation**

Airborne GPS-IMU data and ground control will be converted to a rigid network through a bundle aero-triangulation (AT) adjustment. The final adjustment must include all contiguous data sorties within a single block, or have defined boundaries between logical sized blocks that are “tied” by both ground control and AT measured common tie points. As a demonstration of accuracy for the completed adjustment, a report detailing the results of the triangulation adjustments should be prepared and submitted for review and approval prior to initiation of the digital orthophoto rectification. Residuals shall be reported within an Excel spread sheet for all AT measured points, ground control points and all pre-paneled or photo

ID ground control checkpoints. The report must provide RMSE results and provide a concise and quantified statement of AT and imagery accuracy and precision that is to be signed and certified by the project ASPRS Certified Photogrammetrist.

7.2.6 **Description of Methodology & QA/QC**

Proposals shall include description of the production process, quality assurance and the quality control measures to be included in all major imagery acquisition and photogrammetric mapping tasks. Throughout triangulation, numerous checks shall be made to detect data, point measurement and field control errors.

7.3 **Photogrammetric Compilation**

7.3.1 **Digital Terrain Elevation Model (DTM) (DEM)** A Digital Terrain Model (DTM)/Digital Elevation Model (DEM) shall be utilized at a density level necessary to support the orthophoto production map scale. Terrain/elevation data used in the development of the DEM may be captured by photogrammetric techniques using a softcopy workstation, derived from any available LIDAR data or utilized from a prior aerial photogrammetric project of suitable scale and pixel resolution to support the scale and pixel resolutions of this project. Auto-correlation from the new aerial imagery may also be utilized on the assumption that the project ASPRS CP approves the methodology and point density for the intended purpose and map scale and that the auto-correlated DEM data is edited to prevent image smearing within and adjacent to wooded areas and warping of imagery within and around above ground features such as buildings and bridges. If an existing stereo compiled DEM or LIDAR data set is used, the project area must be reviewed to determine if significant terrain altering activity has occurred since the DEM data was acquired. For all such "update" areas the Consultant shall update the DEM by supplemental/replacement stereo compilation or image auto-correlation. The DEM update will consist of points spaced at regular intervals along a grid, points of significant high or low elevations, and ortho imagery affected specific breaklines at significant terrain breaks. Elevation/terrain data shall be captured at a density level sufficient to accurately represent the shape of the ground and to meet the required orthophoto accuracy standards of this project as reported by the Consultant and approved by MS ORTHO 2018. DTM/DEM data from a prior ortho project may be used for this project only after evidence is provided by the Consultant that the prior DTM/DEM meets the scales and accuracy standards for this project, and the prior DTM/DEM has been updated/supplemented wherever necessary to achieve an accurate and acceptable orthophoto differential rectification and final image.
The technical proposal shall provide a discussion of the DEM source and statement of accuracy and precision that is proposed. This statement must relate the proposed DEM accuracy and precision to the stated final orthophoto map precision that is proposed (ASPRS Class I for final map orthophoto imagery data, etc.).
The Mississippi Department of Environmental Quality (MDEQ) maintains a Geospatial Clearinghouse that includes archived Major LiDAR project data for the entire state. The selected Consultant may acquire existing LiDAR data by contacting MDEQ, with the specific contact information at MDEQ to be provided by MS ORTHO 2018 upon selection of a Consultant. As a summary view, a state/county map prepared by MDEQ indicating existing LiDAR coverage by project and year of acquisition is included within this RFP as attachment H.

7.3.2 **Digital Orthophotography**-The vendor shall describe the production methods, quality assurance and quality control processes that shall be used to deliver orthophoto imagery meeting the following specifications:

7.3.2.1 One set of digital color balanced and radiometrically consistent orthophotography with pixel resolution equal to or better than the resolutions selected from Attachment C for each county. All project areas shall include 4-color band (red, green, blue and NIR) imagery.

7.3.2.2 Tile format shall be based upon 5,000' by 5,000' tile grids. The Consultant may choose to deliver 6-inch imagery as 2,500' by 2,500' grids and 3 inch as 1250' by 1250' grids that are a subset of the master 5,000' by 5,000' project index. Tile names shall be developed by alternating values of northing and easting State Plane coordinate grids, in the same manner as a number of statewide orthophoto project tile schemas (prior annual MS ORTHO projects, NC, SC, VA, etc.) and consistent with the tile naming convention used in prior annual MS ORTHO projects from 2012 through 2017. Six inch tiles shall include a -6 suffix and three inch tiles shall include a -3 suffix to differentiate the pixel resolution from the standard 12 inch for the same tile area. The individual Counties will then take responsibility to re-tile the imagery to match their existing tax map index, which is often PLSS based boundaries for many MS Counties. In addition, respondents should anticipate that some minor re-negotiation of total fee may be involved after review of proposals to adjust cost for shared tiles between County borders that participate in this year's overall project. This negotiation to adjust for duplicate tile deliveries can only realistically occur after proposals are reviewed. Therefore, in the meantime, respondents should calculate pricing for each County on the basis of each County's individual map index requirements and total area for each map scale. This is the basis (total map area for each county, including buffer areas) upon which Attachment C (cost proposal form) is currently formatted.

7.3.2.3 Visible seams or sutures within a tile or between tiles or along seamlines, which exhibit a noticeable "edge" or "displacement" effect, will be grounds for rejection of that tile.

7.3.2.4 **Pilot: project image radiometry.** The Consultant will be required to provide pilot area orthophoto tiles by June 15, 2018 for review and evaluation of color balance, tone, contrast, image sharpening, clarity, portrayal of reasonable details, etc. i.e. general radiometry. These pilot area images will be reviewed by MS ORTHO 2018 and a written report of findings and recommendations will be provided to the Consultant. Pilot imagery will consist of no less than eight of 1" = 200' tiles with a 12 inch pixel and eight of 1"=100' tiles having a six inch pixel. Pilot imagery tiles will be selected from the first two counties that are scheduled for delivery in consideration that the AT and DEM for these counties will be the earliest completed within the production cycle. In addition, pilot tiles will also be required from representative floodplain, cultivated farmland and levy terrain from within at least one of the two Delta Counties that border the Mississippi River. Pilot tiles may include some that adjoin as well as tiles spaced across the County from various terrains of urban, suburban, rural with small towns, farms, forests, rivers and waterways, etc. Raw imagery files will also be delivered of the pilot tile areas in order that a direct comparison can be made of radiometry between initial post processed imagery relative to final orthophoto imagery. The project goal will be to have the pilot imagery evaluated and agreed upon for radiometry between MS ORTHO 2018 and the Consultant before the end of June 2018 in order that the pilot radiometry standards can be confidently and consistently applied across the ten County project consortium.

7.4 **Metadata-**The Consultant shall provide metadata compiled to the current standard endorsed by the Federal Geographic Data Committee (FGDC) for each of the data deliverables. Currently, this is

the Content Standard for Digital Geospatial Metadata Version 2 (FGDCSTD-001-1998).

7.5 **Summary of Deliverables-**The Consultant shall be responsible for producing and delivering at a minimum all of the deliverables that are summarized as RFP Attachment G.

7.6 **Project Data:**

7.6.1 Ortho images: The Consultant shall deliver a complete set of uncompressed digital orthophoto images in a format (GeoTIFF with world file), tiled per the 5,000' by 5,000' master tile grid index and onto media (e.g. portable hard drive) as described. In addition to the uncompressed images, the Consultant shall also deliver to the Client two sets of compressed orthophoto images using an industry accepted compression tool (probably MrSID) and format agreed upon by the Client. The Contractor shall prepare a set of sample compressed images of multiple adjacent orthophotos (as a part of the pilot project as described in RFP section 7.3.2.4 above) with compression ratios of 1:15, 1:20, 1:30 and 1:50 for each pixel resolution of the final imagery for review by MS ORTHO 2018. MS ORTHO 2018 shall then select two of these compression levels for delivery and the Contractor shall create these two sets of the compressed orthophotos using the Client's chosen compression ratios for delivery. This process and delivery of compressed (probably MrSID) files shall apply to County wide imagery datasets as a single compressed mosaic at either twelve inch or six-inch resolution as well as all "town" mapping at six inch pixel.

7.6.2 The DEM used for ortho rectification shall be delivered including enhancements that are necessary as updates for each County and specified Urban area to develop orthophotography to the scale and standards described herein.

7.6.3 An ESRI shapefile shall be delivered containing all seamlines used for the orthophoto tiles. ***Seamlines as a shapefile are a required delivery with all digital orthophoto deliveries, for both pilot and production mapping.*** Seamline polygons shall include and be attributed with date of acquisition, flight line number and exposure number.

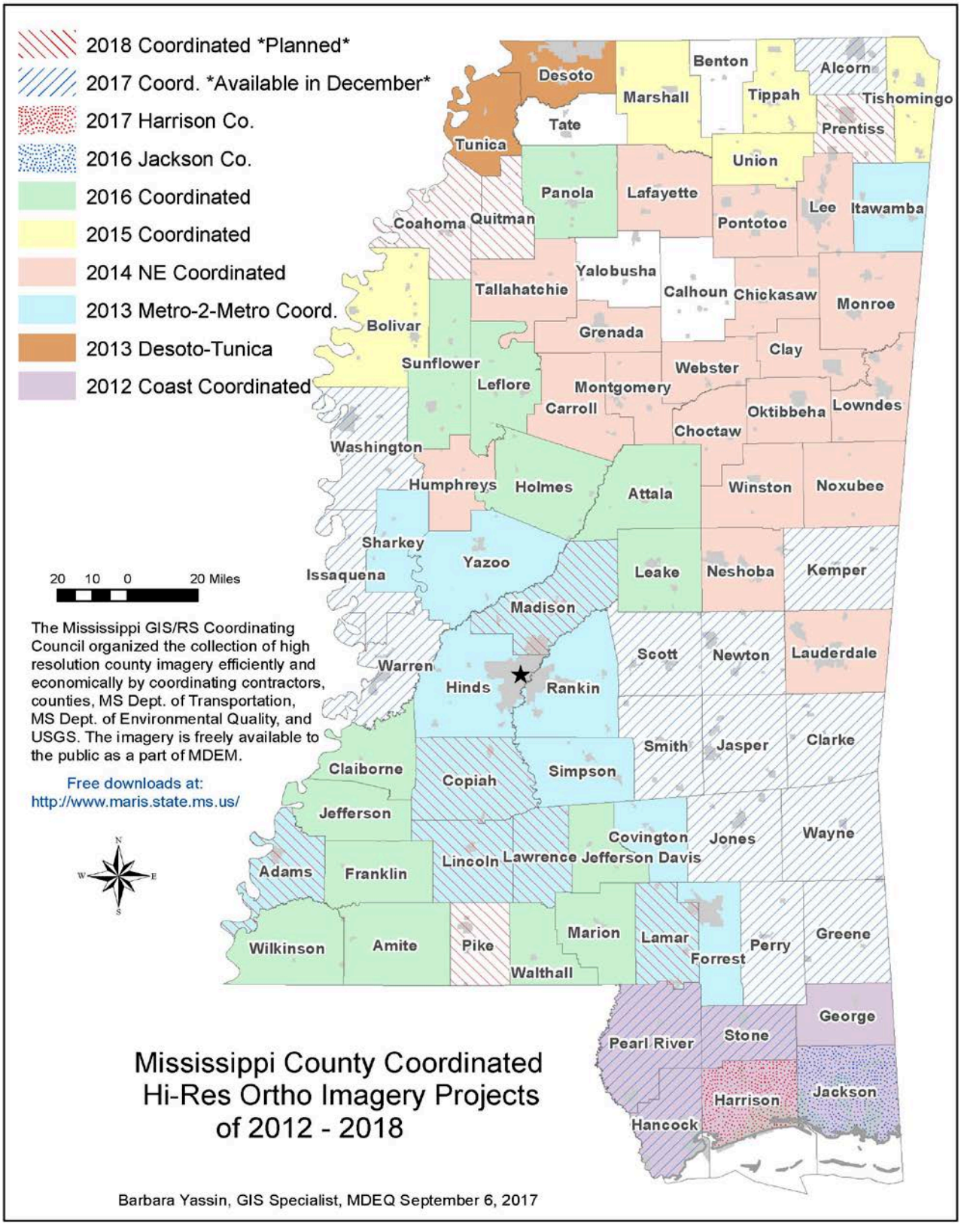
7.6.4 Final digital data (orthophotography, seamlines and DEM data) shall be delivered on a USB 3 external portable hard drive. Digital orthophotography produced for this project shall be consistent across entire Counties or specified Urban project areas and meet or exceed the general requirements identified in the specifications. Work outputs and products, including raw and processed data are the property of the individual Counties and their funding partners that comprise MS ORTHO 2018 and may not be conveyed other than mandated under Statute to any entity without prior approval of the County Boards of Supervisors.

7.6.5 A County-wide map tile index as a shapefile for each County and each individual contiguous block of 6-inch pixel "town" map tiles shall be developed and delivered by the Consultant.

Attachment A: Proposal format

Section	Topic
	Cover Letter
1	Company Overview
2	Project Services (technical proposal)
3	Project Team (organization chart-resumes)
4	Related Experience (references)
5	Proposed Schedule
6	Fee (Attachment C)
7	Sample Orthophoto imagery (both 6 and 12 inch imagery at a minimum)
8	Additional Information

Attachment B: Map of Participating Counties


2018 Coordinated *Planned*
2017 Coord. *Available in December*
2017 Harrison Co.
2016 Jackson Co.
2016 Coordinated
2015 Coordinated
2014 NE Coordinated
2013 Metro-2-Metro Coord.
2013 Desoto-Tunica
2012 Coast Coordinated
20 10 0 20 Miles
The Mississippi GIS/RS Coordinating Council organized the collection of high resolution county imagery efficiently and economically by coordinating contractors, counties, MS Dept. of Transportation, MS Dept. of Environmental Quality, and USGS. The imagery is freely available to the public as a part of MDEM.
Free downloads at:
http://www.maris.state.ms.us/
N
W
E
S
Desoto
Tunica
Tate
Marshall
Benton
Tippah
Alcorn
Tishomingo
Prentiss
Union
Panola
Lafayette
Coahoma
Quitman
Pontotoc
Lee
Itawamba
Yalobusha
Tallahatchie
Calhoun
Chickasaw
Monroe
Bolivar
Grenada
Clay
Sunflower
Webster
Leflore
Montgomery
Carroll
Oktibbeha
Lowndes
Choctaw
Washington
Humphreys
Holmes
Attala
Winston
Noxubee
Sharkey
Yazoo
Issaquena
Leake
Neshoba
Kemper
Madison
Scott
Newton
Lauderdale
Warren
Hinds
Rankin
Smith
Jasper
Clarke
Claiborne
Copiah
Simpson
Jefferson
Covington
Jones
Wayne
Adams
Franklin
Lincoln
Lawrence
Jefferson Davis
Marion
Lamar
Greene
Wilkinson
Amite
Pike
Perry
Forrest
Walthall
George
Pearl River
Stone
Harrison
Jackson
Hancock
Mississippi County Coordinated
Hi-Res Ortho Imagery Projects
of 2012 - 2018
Barbara Yassin, GIS Specialist, MDEQ September 6, 2017

Attachment C: Fee Proposal Form

Project: MS ORTHO 2018 Digital Orthophotography

Respondent: _____

County	Pixel Resolution		Square Miles		Cost Per Square Mile		Total Cost	Optional 6 inch Countywide		
	County-wide	Town	County-wide	Town 100' Scale	County-wide	Town 100' Scale		Yes/No	Square Mile Cost	Total Cost
Adams	6 inch	6 inch	512	N/A			$	N/A		N/A
Coahoma	12 inch	6 inch	638	35			$	No		N/A
Copiah	12 inch	6 inch	799	22			$	No		N/A
Lamar	6 inch	6 inch	516	N/A			$	N/A		N/A
Lawrence	12 inch	6 inch	450	17			$	No		N/A
Lincoln	12 inch	6 inch	711*	74			$	No		N/A
Madison	6 inch	6 inch	766	N/A			$	N/A		N/A
Pike	12 inch	6 inch	508*	132			$	No		N/A
Prentiss	12 inch	6 inch	432	21			$	No		N/A
Quitman	12 inch	6 inch	421	13			$	No		N/A
[redacted]										
A 400+ sq. mi. County	6 inch	N/A	400	1" = 100'	$**					
A 4 sq. mi. urban area	N/A	3 inch	N/A	1" = 50' 4 sq. mi.	N/A	$***				

*The square miles listed herein for Pike and Lincoln are based on a *minimum* buffer of approximately one 5000 x 5000 foot tile beyond the county boundary. The index map shapefiles for these two counties indicate a much wider buffer that also represents the total imagery to be delivered to each of these Counties by using MS 2018 imagery from within adjacent MS 2018 project area Counties.

Additional Notes regarding Attachment C: Fee Proposal Form

1. Partial tiles are allowed along County boundaries that do not include another MS ORTHO 2018 county, or along boundaries of six-inch town blocks within Counties that are being mapped with 12-inch imagery countywide. All County boundaries require mapping to at least a "buffer' distance of 800 feet beyond exterior map block boundaries. All town blocks shall be mapped a minimum of 300 feet beyond the tax map block boundaries. These "buffer" areas are already generally considered within the attached county index map shapefiles and the above table. Financial adjustment for any additional minor area adjustments and overlaps will be made when compiling final map indexes for flight planning and costing (using total area times unit rate) with the selected Consultant as a part of the contract preparation task. Note that Coahoma (along river), Pike and Lincoln have buffer extensions beyond the stated minimum of 800 feet beyond county boundary. See shapefiles and footnotes.

2. The square mile quantities provided in this table are approximate and provided only as a guide for vendors to provide basic unit pricing in order that a consistent total price extension can be calculated per county for purposes of budgeting and fee comparisons.

3. Respondents are responsible for reviewing and confirming the quantities for those counties for which index map shapefiles are provided. ***However, pricing within this Attachment C should be based on the square mile areas shown within the table and should not be changed when submitting proposals.*** Any major discrepancies should be noted as footnotes only in the submitted Attachment C of the proposal.

4. Final reimbursement may be adjusted to the actual quantities of square miles that are included on the final county indexes and the actual quantities accomplished.

5. Respondents should anticipate that some minor re-negotiation of total fee may be involved after review of proposals to adjust cost for shared tiles between County borders that participate in this year's overall project. This negotiation to adjust for duplicate tile deliveries can only realistically occur after proposals are reviewed. Therefore, in the meantime, respondents should calculate pricing for each County on the basis of each County's individual map index, but hold to the square mileage requirements as shown in the above Attachment C Table.

6. **: Please provide a unit price to map an approximate 400 square mile county (or larger, up to 800 square miles) using a six-inch pixel countywide. It is not anticipated at this time that any additional (beyond the 3 reported) MS ORTHO 2018 counties will want countywide 6 inch; however, after review and comparison of pricing some of these counties may choose this option over 12 inch countywide and a unit price is needed to adequately compute a comparison. Do ***not include*** this number in the Grand Total of Attachment C.

7. ***: Please provide a unit price to map an approximate 4 square mile contiguous urban area using a three-inch pixel. It is not known at this time if, where or how many three-inch pixel resolution "blocks" may be required within the Counties having larger and more densely developed municipal areas.

Attachment D: Proposal Grading Sheet

The following Chart will be used as the final score sheet for ranking proposals. There may be additional concerns added based on County or funding partner requests. Each listed "Item" category will be rated on a scale of 1-10 as outlined below (with 10 being the highest). The Score will be calculated using the following formula: Score = Weight x Rate.

Item		Weight	Rate	Score
4.4 4.5	**Technical Approach Quality Control**	**20%**		
4.2 4.3 4.9 4.11 4.12	**Technical Expertise Digital Camera System Staff Qualifications Schedule and Availability Sample Digital Orthophoto**	**20%**		
4.6 4.7 4.8	**Professional Registration Business Registration Firm Background**	**20%**		
4.10	**Similar Project Experience**	**15%**		
4.13	**Other Services***	**0%**		
4.14	**Fee**	**25%**		
		100%	**Total Score**	

Note: "Other" Services or optional proposals will not be considered as a criteria for scoring purposes. Refer to section 4.13 for additional information. However, optional proposals may be a considered factor in the instance of extremely close or tied "Scores".

Attachment E

Mississippi State Plane Coordinate System Designation NAD83(2011)

County	Mississippi State Plane Coordinate System Designation NAD83(2011)
Adams	West
Coahoma	West
Copiah	West
Lamar	East
Lawrence	West
Lincoln	West
Madison	West
Pike	West
Prentiss	East
Quitman	West

Note: Contractors are responsible for verifying the correct Mississippi State Plane Coordinate System NAD83(2011) designation for each County.

RFP ATTACHMENT F

SAMPLE CONTRACT

THIS AGREEMENT, made this _____ day of _____, 2017, by and between BOARD OF SUPERVISORS OF _____County, MS hereinafter referred to as the "**County**", and _____., whose principal office is at _____, hereinafter referred to as the "**Consultant**".

WITNESSETH THAT:

WHEREAS, the **County** desires to engage the **Consultant** to render certain professional services and deliver certain materials hereinafter described; and

WHEREAS, the **Consultant** represents that it is qualified, willing and able to provide the professional services and deliver the requested materials to the **County** according to the **County's** specifications and the terms of this Agreement; it is therefore agreed and understood that:

I. SCOPE OF AGREEMENT

It is the **County's** desire to have the **Consultant** perform aerial imagery and provide digital orthophotos for the entirety of _____ County. The detailed scope of work and deliverables to be provided under this contract are described within the RFP, proposal documents and selection process of the ten MS County consortium entitled MS ORTHO 2018. All of these RFP/Proposal documents are bound herein as an integral part of this **Contract** as Exhibits A-1 through A-5. These are listed below in order of priority in the event of any inconsistent or contradictory provisions:

A-1: The MS ORTHO 2018 Request for Proposals (RFP) dated _____ 2017.
A-2: This contract document executed this _____day of _____ 2017.
A-3: The **Consultant's** response to MS ORTHO 2018 technical and administrative questions associated with shortlist interview dated _____, 2017.
A-4: MS ORTHO 2018 response to bidder's questions dated _____, 2017.
A-5: The **Consultant's** proposal dated _____ 2017.

All required tasks shall be completed in full and all required data and reports shall be delivered by the **Consultant** to the **County** no later than _____, 2018. Digital orthophotos shall be completed by the end of _____ 2018 with the 60 day period until _____, 2018 set aside for QA/QC, image corrections and project wrap-up. All documents, source documents, databases, indexes, digital images, digital data, reports, etc. collected and/or used by the **Consultant** in the development of this project shall be the exclusive property of _____ **County**, and the **Consultant** shall not distribute, sell or loan any of these materials to any other party without full disclosure and ***written consent*** of the County Board of Supervisors. All materials and data used in the Orthophotography and GIS data development and processing will be delivered back to the **County** at the project completion. It is anticipated that the total fee to be paid by the County to the Consultant for this contract will be a Firm Fixed Price of **$_____**

as outlined and described in contract Exhibit "C". Map accuracy shall be defined as ASPRS Class I definition (RMSE better than 1/100th of map scale).

Work shall be completed by the **Consultant** in the following summarized Phases, all of which are described in greater detail within Contract Exhibits A-2 through A-5.

A. **Phase I.** The **Consultant** shall acquire approximate 12-inch pixel digital imagery of the entirety of _____ County with a raw exploitation Ground Sampling Distance (GSD) of equal to or slightly less than 12 inches using a _____ digital sensor. Four bands (each band at 12 or 16-bit depth) shall be captured as RGB and NIR. Aerial imagery shall be captured to an extent such that all County tax maps have full coverage and imagery capture that enables 1" = 200' Orthophoto imagery development at least 800 feet beyond all adjacent County borders, including those that are a part of the MS ORTHO 2018 consortium. The flight plan for this imagery capture is attached as Exhibit B-1. Imagery acquisition must be completed in full prior to objectionable deciduous vegetation leafing in the 2018 flight season, and no later than March 21, 2018. Imagery acquisition shall incorporate Airborne GPS (_____ base solution) and IMU technologies with a report of results provided as a brief narrative and excel spreadsheet of exposure center and attitude results.

B. **Phase II.** The Consultant shall acquire approximate 6-inch digital imagery of the developed Towns of _____ County with a raw exploitation Ground Sampling Distance (GSD) of slightly less than 6 inches using a _____ digital sensor. Four bands (each band at 12 or 16-bit depth) shall be captured as RGB and NIR. Aerial imagery shall be captured to an extent such that all existing 1" = 100' town tax maps have full coverage and imagery capture that enables 1" = 100' Orthophoto imagery development to at least 300 feet beyond all town tax map borders. The flight plan for this imagery capture is attached as Exhibit B-2. Imagery acquisition must be completed in full prior to objectionable deciduous vegetation leafing in the 2018 flight season, and no later than March 21, 2018. Imagery acquisition shall incorporate Airborne GPS (_____base solution) and IMU technologies with a report of results provided as a brief narrative and excel spreadsheet of exposure center and attitude results

C. **Phase III.** The **Consultant** shall provide and utilize pre-paneled or photo ID (PID) ground control points as laid out within Section ___ of the Consultant's proposal and provided herein onto contract Exhibit B-1 (flight plan).

D. **Phase IV.** The **Consultant** shall perform an aero-triangulation (AT) adjustment of all blocks of digital imagery using the ground control points, ABGPS and IMU data as weighted control with a report of results provided as a brief narrative and excel spreadsheet of coordinates, elevations, residuals and statistics. Selected ground control points shall be used as blind check points with residuals calculated and reported. These check points may then be rolled into the final adjustment as primary control.

E. **Phase V.** The **Consultant** shall develop a Digital Elevation Model (DEM) suitable to scale and precision to produce digital orthophotos at scales of 1" = 100' and 1" = 200' at ASPRS Class I accuracy from the digital imagery and AT. This DEM may be developed from existing datasets, auto-correlation from the imagery, existing LiDAR data, stereo compilation or a combination of these methods. The final DEM utilized for Orthophoto rectification shall be delivered to the **County** as an x, y, z ascii file which can be processed for point position within a geodatabase or shapefile.

F. **Phase VI.** The **Consultant** shall produce and deliver a County-wide dataset of 1" = 200' digital orthophotos having a 12-inch pixel ground resolution. The 12 or 16 bit per channel four band digital imagery shall be retained through at least the initial raw exploitation image processing and color balance, with 8-bit imagery output at the end of the process for delivery to the **County**. The orthophoto imagery must be delivered as 5,000' by 5000' tiles with imagery extending at least a minimum of 800 feet beyond all county borders as described in Phase I, above. The **Consultant** shall produce and deliver a town map dataset of 1" = 100' digital orthophotos having a 6-inch pixel ground resolution. The 12 or 16 bit per channel four band digital imagery shall be retained through at least the initial raw exploitation image processing and color balance with 8-bit imagery output at the end of the process for delivery to the County. The town orthophoto imagery must be delivered as either 2500' by 2500' or 5,000' by 5,000' tiles with imagery extending at least a minimum of 300 feet beyond all town borders as described in Phase I, above. All final map data must meet ASPRS Class I accuracy standards.

II. COMMENCEMENT AND PROSECUTION OF WORK

Work done by the **Consultant** will commence immediately upon receipt of authorization to proceed, with all required contract work to be completed in full, approved and accepted by the County no later than _____, 2018. It is expected that both parties will carry out their respective responsibilities as diligently and expeditiously as possible. However, in the event that unforeseen circumstances arise that may delay the timely completion of any part of the project, the following provisions will apply:

A. If the **County** fails to supply the **Consultant** when requested with pertinent and necessary information or materials essential for the progress or completion of any part of the project, then the **Consultant** shall be permitted to effect a temporary suspension of work and make a written request for a contract schedule extension. Whatever time is lost as a result of the **County's** delay in supplying said information or materials will become an extension of the completion date based upon the **County's** concurrence that a reasonable time extension is warranted.

B. Delays on the part of the **Consultant**, not specifically excused by force majeure, as defined below, may be excused and become an extension of the applicable completion date, if:

1. The **Consultant** has submitted in writing and in advance of the applicable completion date, a request that certain delays of work be excused by the **County**, stating therein explicit reasons which would justify such delays; and

2. The **County** responds in writing, granting to the **Consultant** approval for an extension to the applicable completion date for a specified time limit based upon the **Consultant's** request. The **County** shall have the sole authority to accept and grant, or deny, any schedule extension requests by the **Consultant** within this provision of the contract, and the **County** shall not be required to justify or defend any denial; however, the **Consultant** must provide a detailed explanation as to why the **County** should consider any schedule extension request.

C. Force Majeure: The **Consultant** shall not be liable for loss or damage due to delay in delivery resulting from any cause beyond **Consultant's** reasonable control that directly cause a project delay from or due to compliance with any regulations, order, acts, instructions or priority requests of any Federal, State or Municipal Government or any department or agency thereof, civil or military authority, acts of God, acts or omissions of the **County**, fires, floods, unusually severe weather, strikes, blackouts, unforeseen factory shutdowns, embargoes, wars, riots, delays or shortages in transportation, inability to obtain labor, manufacturing facilities or material from **Consultant's** usual sources. In the event of such delay, the **County**, upon the written request of the **Consultant**, shall equitably adjust those contractual provisions as may be affected by such a delay. The **County** shall have the sole authority to accept and grant, or deny, any schedule extension requests by the **Consultant** within this provision of the contract, and the **County** shall not be required to justify or defend any denial; however, the **Consultant** must provide a detailed explanation as to why the **County** should consider any schedule extension request.

III. WARRANTY, LIABILITY, AND STANDARD OF CARE

The **Consultant** shall perform services for the **County** in a professional manner, using that degree of care and skill ordinarily exercised by and consistent with the standards of competent Consultants practicing in the same profession or a similar locality as the project. The **Consultant** shall warrant that the delivered products meet or exceed the requirements as defined by the scope and exhibits of this contract. In the event any portion of the products or deliverables fails to comply with this warranty obligation and the **Consultant** is promptly notified in writing prior to one year after completion of such portion of the services, the **Consultant** shall promptly re-perform or correct such portion of the services at no additional cost to the **County**.

The warranty provided by the **Consultant** is based on the product conforming to mutually agreeable acceptance criteria, established by the **Consultant** and the **County** defined by

the scope and Exhibits of this contract. Regarding review and approval of products and deliverables, all reviews/data inspections are to be performed at the map scale specified for the delivered product. All image quality reviews for purposes of approval are to be performed at not greater than a 2:1 map scale of the specification for the delivered product. The **Consultant** shall not be held responsible for any anomalies or imperfections that may be apparent only at higher levels of zoom beyond a review of 2 times the designated map scale. All alignments, seams, etc. will meet the project specification. Accuracy measurements will conform to the standard as specified for the specific delivered product and conform to the mutually agreed acceptance criteria. Map accuracy requirement shall be as specified by ASPRS Class I mapping for 1" = 100' scale maps developed with a six-inch pixel, 1" = 200' scale maps developed with a twelve inch pixel, and any 1" = 50' scale maps developed with a three inch pixel. Only clearly defined points shall be used for any map scale accuracy checks. This process only applies to unambiguous measurements on clearly defined features. Radiometry/Color balancing is recognized as somewhat subjective; however, the **Consultant** warrants that the total project imagery will meet the radiometry specification agreed to within a representative land cover Pilot area to be mapped as soon as practical after imagery acquisition and before general map production.

If the **County** believes that a delivered product does not meet the project specifications, and has evaluated the product against the acceptance criteria, then the **County** may submit a request for review. A determination should be made of the specific non-compliance by checking the questionable characteristic against the acceptance criteria before submitting a claim against the warranty. Submissions should include complete information, including tile name, location within tile, nature of the problem and the relationship to the acceptance criteria. A screen shot (jpg or bmp) should be provided, if practical. If the **Consultant** agrees, then repair or replacement will occur within thirty (30) days. If the **Consultant** disagrees, the claim will be returned to the **County** with a request for mediation.

This warranty is in lieu of all other warranties. No other warranty, expressed or implied is made or intended by any proposals submitted pursuant to this Contract.

The **Consultant** will provide to the County a current Certificate of Professional Liability Insurance (E&O: errors and omissions policy for the professional services covered by this contract) to cover the tasks and deliverables of this contract, with a policy amount of at least one million dollars. This Professional Liability Insurance coverage is provided by the **Consultant** as a Professional Services Corporation to ensure the faithful and satisfactory performance of this project and is provided as one means to defend and indemnify the **County.** The **Consultant** shall also provide an Accord type certificate of insurance for all liability and workers compensation coverages, the minimum amounts of which must meet State of Mississippi standards and amounts. All referenced policies must remain in full effect for the full duration of the contract period with the E&O policy remaining in continuous effect for at least one full calendar year after the contract completion date. The E&O accord certificate shall reference the **County** as a certificate holder.

IV. PAYMENT TO CONSULTANT

A. Cash payments of the agreed upon total cost for each task of work will be made by the **County** to the **Consultant** as the work is completed and described herein within Exhibit C.

B. The **Consultant** may secure payment for a percentage or the full amount of monies allocated to tasks under each task by submitting to the **County** the following:

1. All deliverable items or evidence of work-in-progress representing that percentage or the full amount of work for which the **Consultant** is claiming payment; and

2. A dated invoice showing the amount of the claimed payment with a brief description of the work done for each separate amount being claimed. Invoices may be submitted monthly based upon work-in-progress and/or deliverables.

3. The **Consultant** shall provide a written project status report to MS ORTHO 2018 for all ten Counties of the consortium; such report shall list individually the status of progress for each **County**. Written status reports shall be submitted once every two weeks for the period of January 1st, 2018 through March 31st, 2018 and then monthly thereafter until all Counties within the MS ORTHO 2018 consortium are 100% finished, delivered and accepted. The **Consultant** shall launch and host a MS ORTHO 2018 project website upon which all status reports and other written communications shall be posted and maintained within topic oriented links or folders. Secure logins will be provided to those MS ORTHO 2018 County and Agency representatives designated by the County Assessor.

C. The **County** will make prompt payments to the **Consultant** following receipt of the items described in Paragraph IV. A and B, above, subject to formal acceptance by the **County** as complete, satisfactory and meeting all applicable specifications of all deliverable items, or evidence of work in progress, representing that percentage of the full amount required to substantiate the claimed payment.

D. The **County** shall pay within thirty (30) days all payment claims submitted by the **Consultant**, meeting all of the above requirements, and not formally disputed by the **County**. The **County** shall not use the disputation of one payment claim as a reason for disputing or not paying on time any other payment claim.

E. The **County** may impose and charge Liquidated Damages of $50 per calendar day for each day that the Consultant is late beyond the final completion date of _____,

2018. Liquidated damages shall be capped at a total of $10,000 (not to exceed) for this contract. As described in previous Sections II.A.B.C, the **Consultant** may request and the **County** may approve an extension of the final completion date. Any such *approved* extension will become an automatic extension in regard to initiating liquidated damages. The Liquidated Damages may be charged as actual compensation for losses and do not constitute a penalty or forfeiture. Liquidated Damages may be deducted by the **County** as an offset to invoices from the **Consultant**.

V. WORK-IN-PROGRESS INSPECTIONS

The **Consultant** shall cooperate fully with the **County** or the **County's** representatives in making possible work-in-progress inspections as frequently as desired by the **County**. In the event the **County** or its representatives reasonably find that project work is not being performed in accordance with the applicable specifications, then the **County** shall promptly notify the **Consultant** in writing of the unacceptable work, and the **Consultant** shall take immediate appropriate corrective actions.

VI. OTHER LEGAL RESPONSIBILITIES OF PARTIES

A. The **Consultant** shall observe and comply with all applicable federal, state, and local laws, ordinances and regulations during its performance under this Agreement.

B. The **Consultant** shall save harmless the **County** and its representatives from all suits, actions or claims of any kind brought on account of any injuries or damages sustained by any person or property in consequence of any act of omission or negligence by the **Consultant** or its employees or agents, or from any claims or amounts due arising or recovered under the State's Worker's Compensation laws. **Consultant's** indemnity and hold harmless obligation undertaken pursuant to this contract, if any, shall specifically exclude that portion of such obligations which could require **Consultant** to indemnify or hold harmless **County**, its agents, employees, or County Consultants for their own negligence or willful acts or omissions.

C. The **County** agrees to mitigate its damages, should any damages arise in the course of this Agreement, to every extent possible, and to take such reasonable measures to prevent injury or damages within its jurisdiction as any reasonable prudent individual or entity would take.

VII. ASSIGNMENT

This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns. Neither party shall assign its rights and/or obligations under this Agreement without the prior written consent of the other party. The RFP by MS ORTHO 2018 required respondents to identify their entire Team, including major subcontractors. The **Consultant** identified _____ as a major sub-consultant which is herein approved for this contract.

_____ as a_____ sub-consultant is also approved. Any additional sub-contractors that the **Consultant** chooses to use in the course of the work shall: 1) be identified in a written request to the **County** prior to use on this project by the **Consultant**. Such identification must include a basic qualifications statement as called for in the MS ORTHO 2018 original RFP with detailed contact information for the requested sub-consultant, and 2) be approved by the **County**. The **County** shall have the sole authority to accept and grant, or deny, any sub-contractor requests by the **Consultant** within this provision of the contract; however, the **County** shall not withhold such permission unreasonably for any written request that is necessary for the **Consultant** to execute the work within the project schedule or specifications. The **Consultant** must provide a detailed explanation as to why the **County** should consider any sub-consultant and approval must be provided in writing by the **County**.

VIII. PRICE ESCALATION

The unit rates contained herein shall remain in effect until September 1st 2019. In the event the **County** should cause the project to be delayed beyond September 1st 2019, then the unit rates contained herein may be adjusted to reflect any increases in the Producer Price Index (PPI). Any services provided to the **County** after September 1st 2019 may reflect the average annual PPI for the calendar year prior to when the services are actually provided. In no event may the **Consultant** adjust any unit rates to any greater amount if the performance of work occurs after September 1st 2019 and the reason the work occurred after this date is due to any cause directly created by the **Consultant**. Any increase in any unit rates shall not exceed 4% in any calendar year.

IX. WAIVER, MODIFICATION AND SEVERABILITY CLAUSE

No waiver, modification or cancellation of any term or condition of this Agreement shall be effective unless made in writing and signed by authorized representatives of each party. Nor shall any waivers be deemed to excuse the performance of any act other than those specifically referred to in said written notice of waiver. If any provisions of this Agreement shall be held to be invalid or unenforceable for any reason, the remaining provisions shall continue to be valid and enforceable, but that by limiting such provision it would become valid or enforceable, then such provision shall be deemed to be written, construed, and enforced as so limited.

X. NOTICE PROVISION

Any notice or communication pertaining to this Agreement shall be deemed to have been duly given by the parties hereto if sent to the other by common courier (i.e. FedEx, UPS) or USPS registered mail with delivery confirmation provided by signature or signed return receipt to the address hereinafter stated, or to such other address as the parties may mutually agree upon.

For the **County:**

_____ County, MS

_____
_____
_____, MS _____

Attn: _____
Tax Assessor

Phone: _____
Fax: _____

For the **Consultant:**

_____.

_____
_____
City, State, Zip

Attn: _____, Project Manager
Phone: _____
email: _____

Attn: _____, Project Principal
Phone: _____
email: _____

The **Consultant** shall ***not*** replace either the designated Project Manager or Project Principal without a prior written request to the **County** and responding written approval from the **County**.

XI. CONSTRUCTION

This Agreement shall be construed and interpreted in accordance with the laws of the State of Mississippi, exclusive of its rules pertaining to conflict of laws.

XII. DISPUTES

Any dispute arising under this contract which is not settled by agreement of the parties may be litigated in the courts of the state from which the contract is issued, or federal courts. Venue for any legal or equitable action hereunder shall be in _____ County, Mississippi.

XIII. ENTIRE AGREEMENT

The terms and conditions of this Agreement and any document specifically incorporated herein by reference, if any, constitute the entire Agreement between the parties. No prior communication, whether written or oral, nor any course of prior dealings between the parties shall be read into such Agreement for purposes of construction, interpretation or any other purposes whatsoever.

IN WITNESS WHEREOF, the parties have caused this instrument, consisting of __ pages and Exhibits A-1, A-3, A-4, A-5, B-1, B-2 and C to be executed by themselves or their duly authorized officers or agents hereunto the day and year first written above.

Board of County Supervisors _____

_____County, MS

By: _____ By:_____

Attest: Attest:

_____ _____ _

Contract Exhibit C

The Consultant shall be paid a Firm Fixed Price (FFP) of $ _____ for County-wide 12-inch pixel and $_____ for 6 inch pixel mapping of towns) for the digital orthophotography as described in the attached contract and exhibits.

This FFP has been calculated based upon the areas to be mapped at the Ground Sampling Distance (GSD) as described within the contract documents and as graphically shown on the project flight and ground control plans; Exhibit B-1 and B-2.

This FFP has been computed by defining the entire land and water body area within the boundaries of _____ County and extending a buffer distance of a minimum of 800 feet beyond all county borders. The resultant total area has been computed as _____ square miles. This minimum area to be mapped has then been multiplied by the contract unit rate for the complete service of digital orthophoto data production and delivery of $_____ per square mile to obtain the resultant FFP of $_____. The towns within the County that have traditionally been mapped at 1" = 100' are to be mapped with a six inch pixel and extending a buffer distance of a minimum of 300 feet beyond town tax mapped boundaries. The resultant town area has been computed as _____ square miles. This minimum area to be mapped with a six-inch pixel has then been multiplied by the contract unit rate for the complete service of digital orthophoto data production and delivery of $_____ per square mile to obtain the resultant FFP of $_____.

The Consultant shall be paid on the basis of monthly work-in-progress invoices as described by contract Section IV. Monthly invoices may be computed a work-in-progress basis using the following percentages times the FFP:

1. 40% for the aerial acquisition phase ($_____).

2. 10% for the ground control and AT production/report phases ($_____).

3. 40% for production and delivery of Orthoimagery ($_____).

4. 10% retainage ($_____).

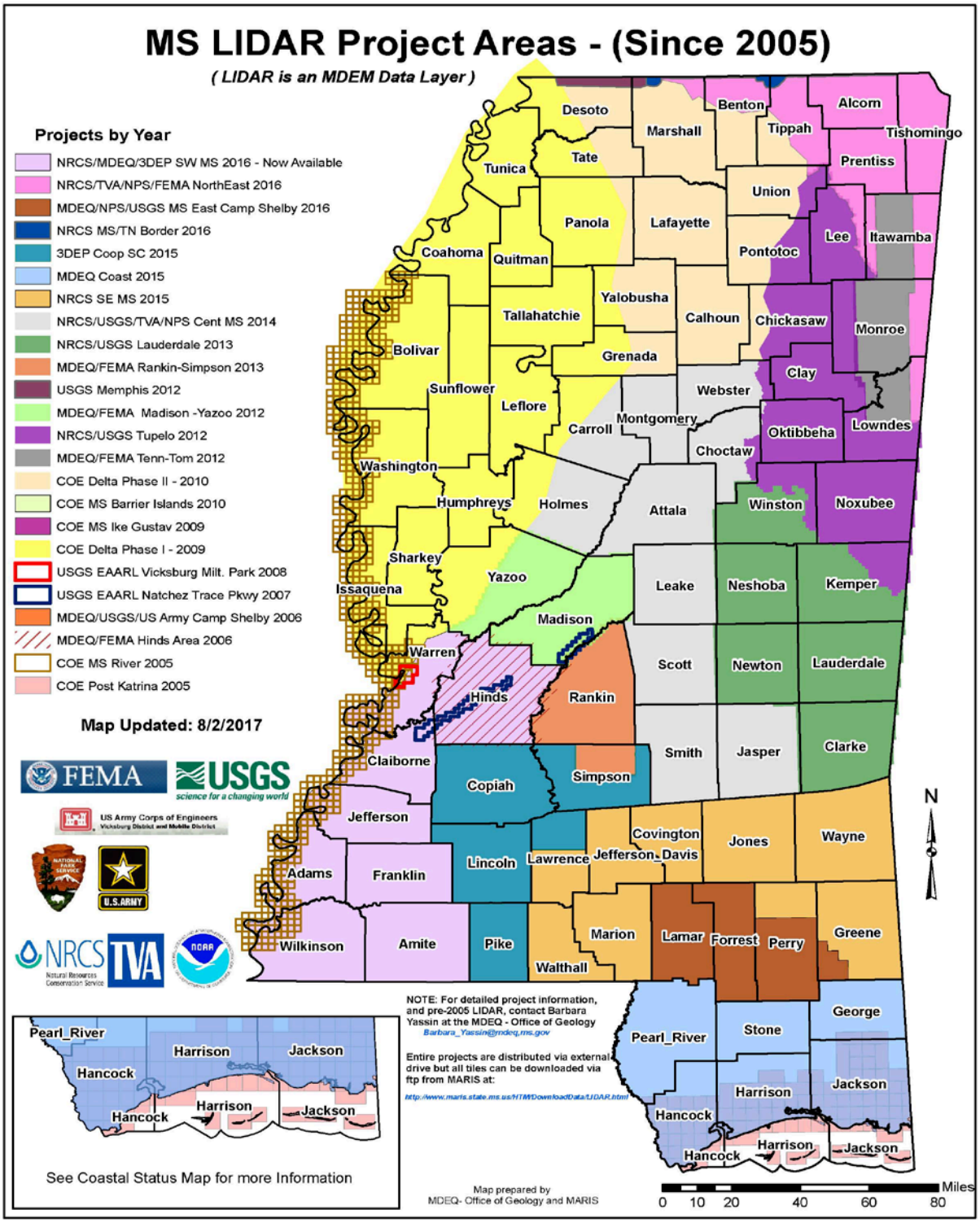
The retainage (#4, above) is to be invoiced and paid as one final single payment when the entire project is 100% complete and approved by the County.

RFP Attachment G

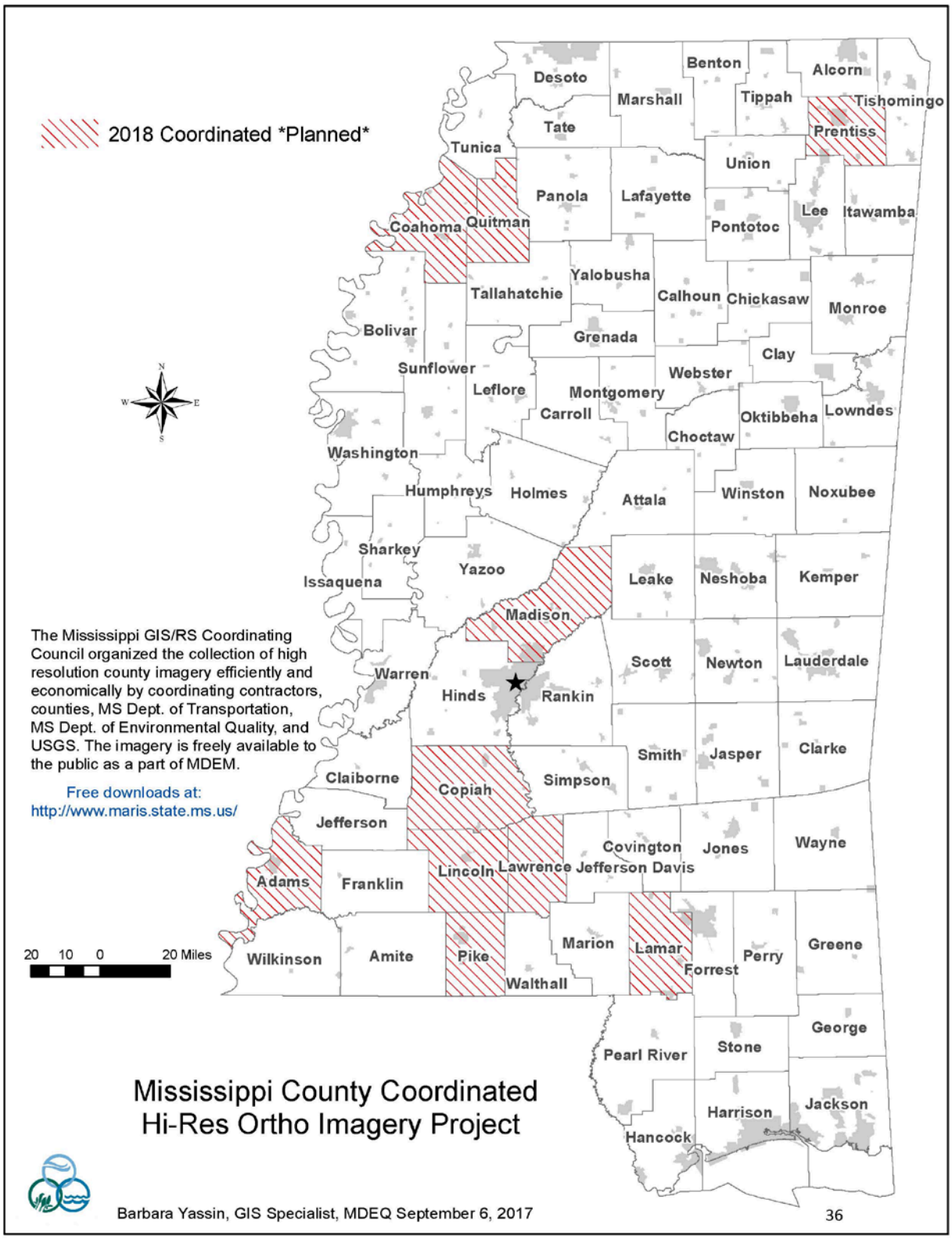
List of MS ORTHO 2018 Project Deliverables

- Contract Exhibit B-1: Flight plan with ground control layout for 12 inch imagery extent.
- Contract Exhibit B-2: Flight plan with ground control layout for 6 inch imagery extent.
- County orthophoto tile index map as shapefile to include County and Municipal boundaries and major roads and water bodies for background reference. Index map to differentiate 12 inch tiles from 6 inch tiles.
- Ground Control report as specified in section 7.2.4 of RFP. One single report covering all of MS ORTHO 2018 will be acceptable.
- Airborne GPS-IMU report as specified in section 7.2.3 of RFP.
- Signed flight logs as specified in section 7.2.2 of RFP.
- Sample raw exploitation imagery as specified section 7.2.2 of RFP.
- Aero-triangulation reports as specified in section 7.2.3 of RFP.
- DEM as specified in section 7.3.1 of RFP.
- Ortho image seamlines as shapefiles as specified in section 7.6.3 of RFP. Seamline polygons should be attributed as noted.
- Pilot project imagery as specified in section 7.3.2.4 of RFP.
- Camera/sensor calibration and/or manufacturer report of characteristics and capability as specified in section 4.3 of RFP.
- Digital orthophoto imagery tiles as specified in sections 7.3.2 and 7.6 of RFP.
- Metadata as specified in section 7.4 of RFP.
- MrSID files as specified in section 7.6 of RFP.
- Certificate of insurance as specified example contract section III.
- Certificate of errors and omissions (E&O) insurance as specified in example contract section III.
- Written status reports as specified in example contract section IV.B.3.
- Monthly invoices as specified in example contract section IV.B.

Attachment H: Available Lidar coverage within MS



View online at: http://www.maris.state.ms.us/metadata/LIDAR/lidar_coverage_area_Aug_2017.pdf


2018 Coordinated *Planned*
Desoto
Marshall
Benton
Tippah
Alcorn
Tishomingo
Prentiss
Tate
Tunica
Union
Panola
Lafayette
Lee
Itawamba
Coahoma
Quitman
Pontotoc
Yalobusha
Tallahatchie
Calhoun
Chickasaw
Monroe
Bolivar
Grenada
Clay
Sunflower
Leflore
Webster
Montgomery
Carroll
Oktibbeha
Lowndes
Choctaw
Washington
Humphreys
Holmes
Attala
Winston
Noxubee
Sharkey
Issaquena
Yazoo
Leake
Neshoba
Kemper
Madison
Warren
Hinds
Rankin
Scott
Newton
Lauderdale
Smith
Jasper
Clarke
Claiborne
Copiah
Simpson
Jefferson
Covington
Jones
Wayne
Adams
Franklin
Lincoln
Lawrence
Jefferson Davis
Wilkinson
Amite
Pike
Walthall
Marion
Lamar
Forrest
Perry
Greene
Pearl River
Stone
George
Harrison
Jackson
Hancock
The Mississippi GIS/RS Coordinating Council organized the collection of high resolution county imagery efficiently and economically by coordinating contractors, counties, MS Dept. of Transportation, MS Dept. of Environmental Quality, and USGS. The imagery is freely available to the public as a part of MDEM.
Free downloads at:
http://www.maris.state.ms.us/
20 10 0 20 Miles
Mississippi County Coordinated
Hi-Res Ortho Imagery Project
Barbara Yassin, GIS Specialist, MDEQ September 6, 2017
36

Contract Attachment Exhibit A-3: Shortlist Interview Questios and Answers

A-3 Shortlist Interview Questions

A-3: Consultants response to MS ORTHO 2018 Technical and Administrative questions associated with the Shortlist interview dated October 6, 2017

NONE

Subject: Question Regarding RFP

Please see the RFP questions and response below.

1. Do you have any quantitative or other criteria for the limit of building lean in the orthoimagery?

<!--[if !supportLists]-->2. <!--[endif]-->Can we get a sample of the 2017 orthoimagery and indication of what sensor type used?

We did not establish quantitative measures for building lean. An ADS 100 has been used for the past several years of MS Ortho capturing GSD at about same resolution as final pixel resolution and flight plan with approximate 30% sidelap. As described in the RFP, we received several comments from Counties in 2017 that building lean at certain lovations (probably extreme boundaries of sidelap) appeared more noticable than past episodes. These previous datasets of imagery were typically RC-30 film cameras flown at standard 5x, 60%/30% format. We explored establishing a specification of height to width ratio or sidelap limit, or cross track maximum, etc.; however, the wide variability of geometry for various digital sensors made this a complex and confusing undertaking that might invariably penalize a sensor that taken as a whole is quite acceptable. We recognize that 30% sidelap on an ADS 100 is industry acceptable, but does present greater extremes of building lean on extreme edges than the older standard format film systems. Therfore, we are asking respondents to provide some basic and simple presentation of their specific acquisition system and flight plan, the level of extreme edge building lean that will occur and any adjustments in flight planning (if any are necessary) that have been taken to mitigate this issue.

As regards 2017 samples, we are checking to get a list and urls for some example County GIS websites that have 2016 or 2017 Ortho imagery that would be representative of past MS Ortho imagery. We will send this out to all interested respondents in the next several days

Best Regards,

S. Blake Wallace, Executive Director
Hinds County Economic Development Authority
Mailing Address: PO Box 248, Jackson, MS 39205
Physical Address: 125 South Congress Street, Jackson, MS 39201
blake@selecthinds.com | Mobile: 601-572-7201
Office: 601-353-6056 | Fax: 601-353-7179

Proposal

Attention: Mr. Blake Wallace

Hinds County Economic Development Authority
125 South Congress, Suite 1500
Jackson, MS 39201

Proposal for
MS ORTHO 2018
Aerial Photography Update Initiative 2017-2018

Submitted By:

Surdex Corporation

Ryan Burley
Vice President, Business Development
Tel: 206-915-3294
Email: RyanB@surdex.com
520 Spirit of St. Louis Blvd.
Chesterfield, MO 63305

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Cover Letter

November 1, 2017

Mr. Blake Wallace
Hinds County Economic Development Authority
125 South Congress, Suite 1500
Jackson, MS 39201

RE: MS ORTHO 2018 Aerial Photography Update Initiative 2017-2018

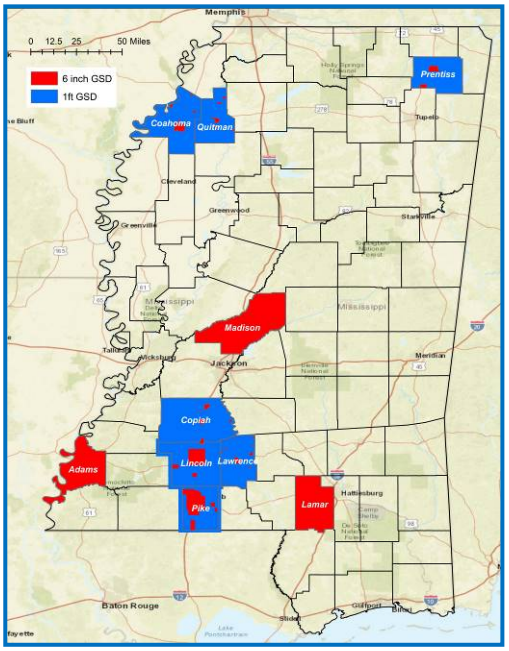
Dear Mr. Wallace and Review Team:

Surdex is pleased to once again submit our fully-compliant response to your Request for Proposals, "*MS ORTHO 2018 Aerial Photography Update Initiative 2017-2018.*" We are confident our experience handling the 2014, 2015, 2016 and 2017 projects will bring the regional familiarity, experience, and resources required to make this project a success. *No off-shore contracting will be performed on this project*.

Understanding of the Project

The 2018 project entails the acquisition of ten (10) counties at resolutions of 12" and/or 6" during the winter/spring 2018 leaf-off season. Deliveries of the 4-band orthoimagery are to begin the end of July, 2018 and all counties are to be delivered and accepted by December 15, 2018. Adams, Lamar, and Madison counties require full coverage at 6" resolution, whereas the remaining counties are requesting a base resolution of 12" with town coverage in various areas at 6" resolution.

Summary of County Coverage Requirements		
County	**1' Sq Mi**	**6" Sq Mi**
Adams		512
Coahoma	638	35
Copiah	799	22
Lamar		516
Lawrence	450	17
Lincoln	711	74
Madison		766
Pike	508	132
Prentiss	432	21
Quitman	421	13
Totals	**3,959 Sq Mi**	**2,108 Sq Mi**



From a data acquisition and production standpoint, there are several factors impacting the project approach (flight planning and control survey), and, consequently, cost:

- The discontinuity of the counties results in lower acquisition efficiency.
- The noncontiguous 6" areas of interest (AOIs) within some counties reduces acquisition efficiency.
- To meet accuracy standards, additional survey control is required for the scattered AOIs of 6" resolution.

After studying the intricacies of this project, we have developed what we consider to be the most efficient approach to acquisition.

Surdex Qualifications and Ability to Perform: We believe the primary reasons the consortium should select Surdex for this project are:

- Proven experience with the four previous successful projects with the Consortium.
- Proven track record for on-time delivery of high-quality, high-accuracy products.
- Proven imaging technology that increases acquisition and production performance. Surdex owns and operates five (5) Leica ADS100 pushbroom sensors.
- All imagery acquisition and production will be handled by Surdex, ensuring a consistent product at all resolutions and full control of delivery performance.
- Surdex will provide ground survey for the consortium.
- Surdex is providing Our SurCheck℠ web-based inspection tool.

Surdex has been responsible for three of the consortiums past projects. These are summarized in the following table.

Surdex understands the importance of maintaining a competitive pricing structure and how cost is weighted in the 2018 selection criteria. The impact of acquisition efficiency as noted above has been considered as well as a competitive price. Based on our Mississippi experience and market understanding Surdex has made an adjustment to be more competitive. This is accompanied by the ongoing consistency of communication and project oversight by Cornell Rowan.

Surdex's Past Projects for the Consortium

Year	Number of Counties	Approx. 12" Sq. Mi.	Approx. 6" Sq. Mi.
2014	18	10,317	1,579
2015*	11	7,223	260
2016	19	8,822	351
2017	17	9,878	1,815
Totals	**65**	**36,240**	**4,005**

**Note: 6 of the 2015 12" counties and the 6" products for all 11 counties were combined with the 2016 project due to adverse acquisition conditions in 2015*

Business Registration in Mississippi: Surdex is registered as a Foreign Business with Mississippi Secretary of State, and is in Good Standing.

Foreign Business Registration

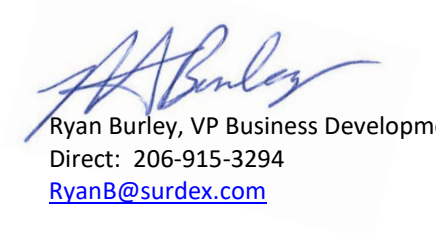
State of Mississippi

Name:	Surdex Corporation	Business ID:	1025282
Name Type:	Legal	Status:	Good Standing
Principal Office Address:	520 Spirit of St. Louis Blvd. Chesterfield, MO 63005	Creation Date:	7/30/2013

If you have any questions or comments, do not hesitate to contact me at any point in the evaluation process.

Sincerely,

Surdex Point of Contact



Ryan Burley, VP Business Development
Direct: 206-915-3294
RyanB@surdex.com

Authorized Agent

Ronald C. Hoffmann, President
Office: 636-368-4400
RonHCorp@surdex.com

Addendum Confirmations

MSORTHO 2018: Questions & Answers

No formal addendums were issued for this proposal.

Table of Contents

Section 1: Company Overview

1.1 SURDEX CORPORATION

1.1.1 Name of Firm	Surdex Corporation
Business Address	520 Spirit of St. Louis Blvd. Chesterfield, MO 63005-1002 United States
Contract Negotiator	Ron Hoffman, President – Authorized Agent
Website	www.surdex.com
Phone / Facsimile	636-368-4400 36-368-4401
1.1.2 Year Established	Est. 1954, Missouri
1.1.3 Former Names	N/A
1.1.4 Type Ownership	S-Corporation
FEIN	43-0690641
1.1.5 Location of Office to Provide Services	**Surdex Corporation** 520 Spirit of St. Louis Blvd. Chesterfield, Missouri 63005 Office: 636-368-4400 | Fax: 636-368-4401
Project Contact	**Ryan Burley, VP Business Development** RyanB@surdex.com Direct: 206-915-3294

All of Surdex's personnel, with the exception of a business development representative and two project managers operate out of the main office and production facility in Chesterfield, Missouri. Our facilities include:

- A 17,000 square foot production and administrative office, including a secure area within the building.
- A 30,000 square foot hangar facility several blocks from the office with direct access to one of the two runways.

Surdex headquarters building (left) and hangar (right) on Spirit of St. Louis airport grounds.

1.1.6 Background on Surdex Corporation

Surdex Corporation is a privately-owned company focused on providing geospatial data and services throughout North America. We are headquartered on the grounds of the Spirit of St. Louis Airport in Chesterfield, Missouri. We have been in business since 1954 under the same name and we have a strong foundation in aerial data acquisition and geospatial data services. Surdex's clientele include federal, state, and local government as well as private engineering, defense mapping, Homeland Security, and utilities.

Features and Benefits of Surdex	
Feature	**Benefit**
In continuous operation under the same ownership for over a half-century.	Demonstrated staying power assuring clients of financial stability and ability to invest in new technology.
Aggressive research and development effort to improve performance, accuracy, and quality.	Demonstrated adoption of new technology and solutions to provide the highest quality services to our client base.
A base of leadership and experience exemplified by an extremely good retention rate. Our senior staff averages over 25 years of experience at Surdex and within the profession.	We can draw upon our experience and knowledge to ensure a successful project.
A strong dedication to project management and client interaction.	We involve our clients as true partners and emphasize communication of information sharing to ensure successful projects.
Our staff has numerous certifications in surveying and photogrammetry.	Demonstrated professional knowledge and achievement that assures our clients of professionalism.
A large fleet of aircraft and a diverse variety of imaging and LiDAR instruments	Ability to handle large projects without outside resources. We can address a large variety of aerial acquisition requirements.

1.1.6.1 Geospatial Services Offered by Surdex

Surdex's Geospatial Data Services	
Service	**Benefit**
Aerial data acquisition with digital imaging sensors as well as LiDAR.	Foundation for digital orthophotos, planimetric mapping, and topographic mapping.
Surdex's highly customized digital orthophoto production process.	Highest possible quality products and schedule assurance.
LiDAR data acquisition and processing for bare earth and hydro-enforced elevation models, classifications, and contours.	Full service topographic mapping at the highest accuracy levels.
Stereocompilation equipment and software for topographic modeling and planimetric mapping from film and digital imagery.	Accurate and high quality mapping.

The performance of a company is heavily based on its qualified and experienced personnel. Surdex has attracted numerous highly-qualified personnel and our retention of this staff is one of our strengths. Of our 25 people in leadership positions, they average over 25 years in the mapping profession and over 15 years employment by Surdex.

Our staff includes:

- 9 ASPRS Certified Photogrammetrists.
- 3 registered professionals (survey and engineering).
- Project Management Professional (PMP) certification.

1.1.6.2 Longevity and Financial Stability

Over the last two decades, Surdex has grown from a regional geospatial provider to a company providing expanded services throughout the United States, Canada, and Mexico. We have a strong background in both prime contracting and working for other companies in the geospatial data and services realm. As a testament to our ability to manage subcontractors, Surdex has served as the prime contractor on large projects that have included up to six subcontractors and over a dozen aircraft.

With our expertise in aerial data capture, Surdex is well equipped to perform on large projects. Over the last two decades, we have participated in multiple large regional/statewide programs and consistently been the #1 or #2 ranked contractor on the USDA National Agriculture Imagery Program (NAIP). Additionally, Surdex has been responsible for the statewide contracts for Missouri, Texas, Iowa and Illinois.

Demonstration of the financial viability of a company is generally based on the analysis of financial reports. However, a very good indication is the consistency of the financial backing the company receives during periods of investment and growth and how this backing is organized. In Surdex's case, our privately-owned company only depends upon a local bank and does not rely upon outside investors. Over the last decade, Surdex has transformed from primarily a regional company to a nationwide company that is now one of the 10 largest pure professional mapping companies in North America. During this timeframe, our revenue has more than doubled. We have had to face large investment in aircraft, new LiDAR technology, and new digital sensor technology. Our bank has provided steadfast support throughout – and continues to – as we purchased over $15M in aircraft, sensor, and IT equipment during this period. The support from our bank testifies to the fact we are financially stable without dependence on outside investors. Another good indicator is the Debt to Equity Ratio and Surdex's ratio of 5.7 is excellent in a capital-intensive profession. This ratio is primarily a result of the ownership's insistence on re-investing earnings in the company.

1.1.7 Offshore Services

Surdex will not utilize off-shore subcontracting services for this project. Surdex only utilizes offshore services with the request and permission of its clients and rarely subcontracts digital orthoimagery production due to our customized process flow and software.

1.1.8 Subcontracting

Surdex will not require any subcontractors on this effort, ensuring success of the program by retaining complete control of resources.

Section 2: Project Services

This section follows the Project Services as described in the RFP.

2.1 Mapping Equipment and Software

The following is a list of equipment owned and operated by Surdex Corporation.

Orthoimagery and Survey Equipment & Software		
Compilation and Orthoimagery		**Survey**
Stereo Compilation and Mapping 12–Dell Dual Pentium Workstations 3–Summit Evolution First Order Softcopy Instruments Direct collection into Arc GIS	**Map Edit/Finishing** 12–File Servers 4–Workstation Computers 3–GIS Arc/INFO Workstations **Digital Orthoimagery and Imaging** 1–Scalar 1000 Tape Library System 100+ Core Processing Cluster 12–Workstations	28–GNSS Receivers 5 –Trimble Navigation 4600 2–Ashtech Z-12 GNSS receivers 13–Trimble 5700 GNSS receivers 8–Data Collectors 4–Hand-held 4–Trimble 2–EDM's 7–Total Stations
GIS /CADD Software	**Photogrammetric Software**	**Surdex Enterprise Database**
13 – ESRI ArcGIS for Desktop 6 - KDMS 3 - AutoCAD 8 - Bentley MicroStation GEOPAK Survey (1) GEOPAK Site (1) GEOPAK Descartes (2) InRoads	ImageStation Aerial Triangulation (ISAT) 14 – Softplotter Leica XPro Adjustment Software, ImageStation Automatic Triangulation Software Socet Set / ORIMA Surdex proprietary contour generation	Surdex Inspection Tool Surdex Ortho Surdex Group Tool Client Product Acceptance Tool

2.2 General Requirements

2.2.1 Datum, Projection and Accuracy

All deliverables will be in the Mississippi SPCS in NAD83 (2011). Some counties fall in the East and some in the West zones. Based on the ASPRS Class I standards (March 1990), the accuracy parameters for the various resolutions are encapsulated below. Class I has been changed to "Standard Mapping and GIS Work" in the latest version of the ASPRS accuracy guidelines.

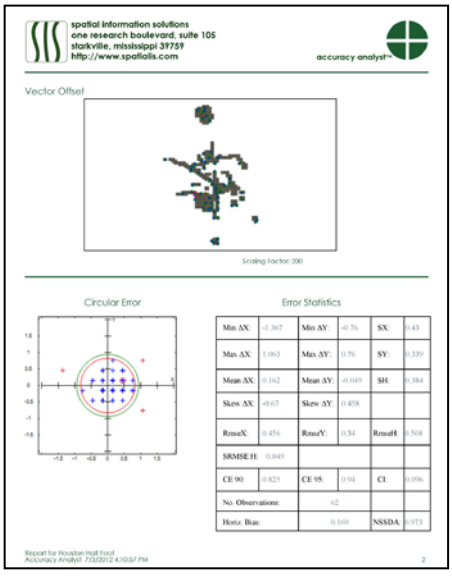
ASPRS Class I Accuracy Parameters			
GSD	**Limiting X,Y**	**$RMSE_r$**	**CE95**
12" / 1'	2.0'	2.83'	4.90'
6" / 0.5'	1.0'	1.41'	2.45'
3" / 0.25'	0.5'	0.71'	1.22'

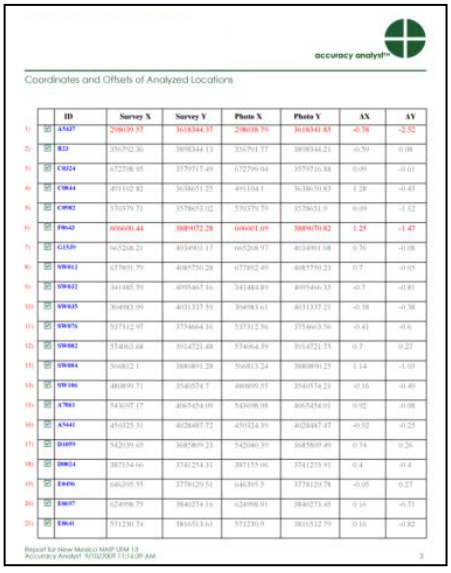
Surdex's customized production software is extremely adept at supporting multiple projections, tile layouts, resolution changes, etc. As such, we see minimal risk in dealing with a variety of reference frames (projections, datums, linear units) for this project. During final project design, we will work with the consortium to finalize all reference frames and deliverable tile layouts to ensure that the design for imagery acquisition and ground control cover the total extent required.

All production takes place in a seamless (contiguous tile layout) "Master Tile" scheme in a reference frame and resolution selected to most common to all project areas. Once the Master Tiles are created, they are cut to various tile layouts desired by our clients. Since we focus all corrections made during internal QC and in reaction to client call-outs on the Master Tiles, it is simple to re-cut any required deliverables affected by the correction. Only minimal additional QC is required to check re-cut deliverable tiles. All Master Tiles and layout schemes are archived for each project and are available for months, or even years, down the road to support additional corrective action.

Surdex uses the Accuracy Analyst software from CompassData for the validation of digital orthophoto accuracy. This software accepts point coordinates and guides the user through measuring points on the orthoimagery tiles. It has extensive analysis and reporting tools that adhere to ASPRS/NSSDA specifications and guidelines.

Accuracy Analyst measurement and reporting.





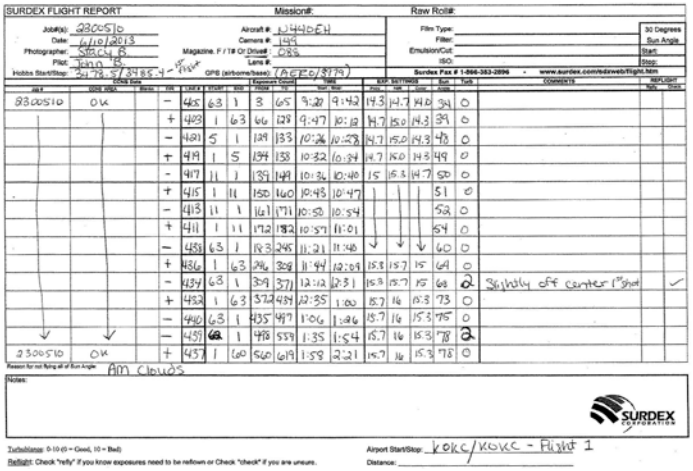
2.2.2 Aerial Acquisition

The following table embodies our understanding of the acquisition specifications.

Acquisition Specifications		
Parameter/Specification	**Value**	**Comment**
Resolutions	6”/0.5’ and/or 12”/1.0’ GSD Potentially some areas at 3”/0.25’	If a county opts to go with 6” countywide (versus 12”), then 6” areas may move to 3” resolution
Re-flights	It is Surdex’s responsibility to re-fly areas within the same flight season	Quick inspection is used to isolate potential re-flights. Re-flights are prioritized to ensure minimal time lapse between the initial acquisition and the re-flight.
Vegetation conditions	Leaf-off – deciduous foliage must be dormant	Adams and Coahoma counties must be acquired in the Mississippi River floodplain to achieve the correct river levels.
Acquisition season	Nominally mid-January through March 21, 2018	Start and finish of acquisition at the approval of the Consortium
Minimum sun angle	Minimum 30°	May be cause for rejection – at the discretion of the consortium.
Cloud/cloud shadow cover	Less than 5% of project area	
Ground conditions	Free of smoke Free of haze Free of standing water Free of ice and snow Free of excessive flooding (other than customary seasonal flooding)	
Crab	Less than 5° between successive exposures Less than 3° average over the project	
Specular reflection	Resulting orthos will not exhibit obscured detail of surrounding features	
Side overlap	30% ± 5%	
Forward overlap	60% (not applicable to pushbroom digital cameras)	

An example of a standard Surdex flight log is shown below. As requested, this will be modified to include the signature of the aircrew (pilot and sensor operator). Flight logs are faxed to the Surdex production center at the end of each day, along with e-mail/ftp versions of the detailed flight data.

Example Surdex flight log.



Surdex always provides sample raw imagery for clients to appraise before production begins. Such "reference imagery" is used to iterate with each client to arrive at the desired "colorimetry" (color, tone, balance, etc.) for the final product. This subject is discussed in more detail in a later section of this response under "Sample Exploitation Imagery."

Surdex will utilize the Leica ADS100 pushbroom digital camera that simultaneously collects imagery in color (RGB) and near-infrared (NIR) in the forward, aft, and nadir arrays. This supports the creation of color, 4-band, and/or color infrared (CIR) imagery products. ABGPS and IMU data is collected simultaneously with the imagery for accurate geopositioning and refinement during the aerotriangulation process. Unlike nearly all other large-format digital frame cameras, pan-sharpening is not used by the ADS100.

All flight plans will use Leica's recommendations for flying height above ground level (AGL) to ensure that the imaged resolution is equal to, or finer than, the required resolution. Like all other digital cameras, the Leica ADS100 parameters for focal length (62.5mm) and CCD pixel size (0.005mm) dictate the nominal flying height above ground level. The ratio of the two parameters (62.5/0.005 = 12,500) is multiplied by the desired ground resolution to obtain the maximum flying height. The table illustrates these values for the possible project resolutions.

ADS100 Flying Heights (AGL) Based on Leica Recommendations		
Height: GSD ratio: 12,500 Nadir pixel width = 20,000 pixels		
Resolution	**Flying Height (AGL, Feet)**	**Swath Width (Nadir)**
3"/0.25'	3,125'	5,000'
6"/0.5'	6,250'	10,000'
12"/1'	12,500'	20,000'

2.2.2.1 The Leica ADS100 Pushbroom Sensor

The ADS100 is the newest generation of Leica's line scanner (pushbroom) sensor. Delivered in July, 2013, the first two Surdex ADS100s were the first installed, integrated, and tested in the United States. Surdex purchased two additional ADS100's in 2014 and a fifth in the spring of 2016. Our five ADS100s represent the largest installation in the United States and one of the largest in the world. Having deployed the ADS100 as our primary sensor since late 2013, Surdex-led teams have acquired over 3 million square miles of coverage.

Features and Benefits of the ADS100	
Feature	**Benefit**
20,000 pixels wide at nadir – largest swath of any digital sensor used today	Fewer resources required for large projects
Smallest pixel size (5um) of any sensor used today, allowing an increase in acquisition altitude	Better acquisition performance in rugged terrain (fewer line breaks required) Operates above numerous problematic airspaces
Acquisition of all spectral bands at full resolution – pan-sharpening is not used	Sharp feature detail and imagery devoid of blooming and smearing caused by pan-sharpening utilized by virtually every frame format camera.
Time-Delayed-Integration (TDI) image motion compensation for the first time in a pushbroom system: (1) Reduces integration/cycle time (2) Increases sensitivity (3) Increases airspeeds	Improved acquisition performance Higher image quality
With the telecentric lens design: (1) Image rays strike focal plane perpendicular to focal plane (2) Consistent response across entire array	No fall-off at edges of format as with conventional frame-format film and digital systems Allows better color match and tone with adjoining strips

Feature	Benefit
Nadir, forward, back arrays have full color and near infrared	Improved stereoscopic viewing and exploitation
Superior stereoscopic geometry: (1) Best base-to-height ratio (0.8) of any sensor on the market – 33% better than traditional film mapping cameras (2) Superb horizontal and vertical accuracy	Superior accuracy for digital orthophotos and topographic mapping
Discrete (non-overlapping) spectral bands	Vibrant colors Robust natural color and color infrared Superior remote sensing application
Benefits of the pushbroom approach: (1) Near-nadir views of ground features (2) Fewer seamlines required in mosaicking process (3) Continuous stereoscopic imaging using the forward and aft arrays	Substantially less building lean Reduced customer QC effort Unlike frame-format cameras, full stereoscopic coverage along the flight direction in rugged terrain

Pushbroom systems present the optimal imaging geometry for digital orthoimagery. With the relief displacement only varying across the format – and not radial from the center as with frame-format film and digital cameras – the amount of building/structural lean in the final product is substantially reduced. The "pixel carpet" acquired by the ADS100 substantially reduces the amount of seamlines required to mosaic the orthoimages together. This improves the production effort by minimizing the number of artifacts surrounding seamlines. Correspondingly, the inspection effort is reduced since fewer seamlines need to be validated.

The ADS100 stereoscopic geometry yields the highest attainable horizontal and vertical accuracies of any sensor on the market today. The 43.3° angle between forward and aft arrays results in a base-to-height ratio of 0.8 – which is superior even to traditional film mapping cameras at 0.6. The problem of maintaining sufficient forward overlap in rugged terrain traditionally found in frame cameras is less of a problem for pushbroom sensors.

With each band (R,G,B,NIR) in each array collecting at full resolution, features imaged by the ADS100 are sharp and do not exhibit the blooming and smearing attributed to the pan-sharpening approach taken by virtually every large-format digital frame camera on the market today. This enhances interpretation and results in an aesthetically pleasing rendition of color.

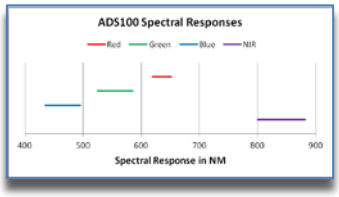
The lenses of conventional frame-format film and digital cameras suffer from the well-known "fall-off" issues at the edge of the format. With the telecentric design of the ADS series, all light rays strike the focal plane at a right angle and yields the same radiometry response at all points.

The ADS100 configuration consists of:

- The camera unit
- A controller unit
- Mass memory device (solid state)
- An improved PAV100 gyro-stabilized mount
- Sensor operator and pilot consoles
- An integrated MicroIMS ABGPS/IMU unit

ADS100 Components and Installation in a Surdex Cessna 441 (Conquest) Aircraft.

The following tables summarize the details of the ADS100.

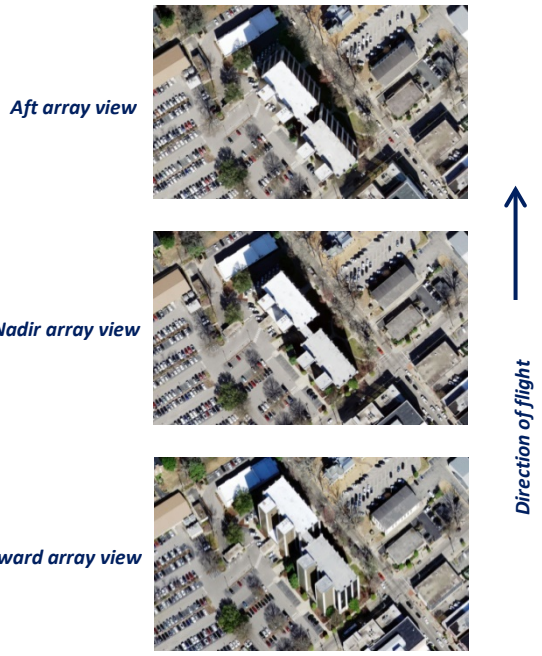
ADS100 Specifications		
Parameter	**Specification**	
Sensor Type	Pushbroom	
Pan-sharpening	None	
Cross-track pixels	Forward: 16,000 Nadir: 20,000 Aft: 18,000	
Focal length	62.5 mm	
F-number	f4	
Pixel size	5.0 um	
Pixel registration accuracy	1 um	
Integration time	<1 ms	
Height: GSD ratio	12,500:1	
Cross-track field of view (FOV)	77.3°	
Along-track field of view (FOV)	Fwd: 25.6° Aft: 17.7° Stereo (Fwd + Aft): 43.3°	
B/H Ratio	0.80 (Traditional film cameras: 0.6)	
Radiometric resolution	14 bits/pixel	
Imaging: R= red G = green B = blue N = near infrared	13 Arrays: Fwd: RGBN Nadir: RGGBN Aft: RGBN	
Radiometric response (nm): Red Green Blue Near Infrared (NIR)	619-651 525-585 435-495 808-882	

The following graphics portray the imaging geometry of the ADS100. All arrays in the forward, nadir, and aft configurations simultaneously collect data in all 4 bands – a significant improvement over the preceding ADS40 and ADS80 models built by Leica. The forward and aft arrays provide alternative views of the ground scene and provide the stereoscopic views.

Imaging geometry of the ADS100				
Array	**Bands**	**From Nadir**	**FOV**	**Pixels**
Forward	RGBN	25.6°	65.2°	16,000
Nadir	RGGBN	0°	77.3°	20,000
Backward	RGBN	17.7°	72.5°	18,000

The Leica XPro software handles all image post-processing, aerotriangulation, orthorectification, etc. This highly efficient software operates in a distributed processing environment. Features of the software include automated handing of atmospheric and BRDF (Bi-directional Reflectance Distribution Function) in a manner that minimizes the need to create intermediate image files. For example, even raw orthoimages can be reviewed without writing the files to disk until all adjustments are made.

ADS100 imaging operations.



2.2.2.2 Aircraft

Surdex is widely regarded by clients and colleagues as one of the premier aerial acquisition companies in North America. These accolades originate with the ownership of the company – three of whom are licensed pilots. It also comes from the pragmatic view that it is the most critical phase of any project we undertake.

The makeup of our fleet of aircraft is based on:

- Ability to host each of our aerial data acquisition instruments (film, digital, and LiDAR).
- All aircraft are made by the same manufacturer (Cessna) to standardize maintenance and operation.
- A mix of slower/lower and faster/higher aircraft to host all acquisition equipment.

Surdex's Acquisition Aircraft

Make/Model (Type)	Engine	Ceiling/ Airspeed	Picture
Four (4) Cessna 441 Conquest II-10 With RVSM*	Twin-Turbine Pressurized	Flight Range: 2,193 nm Altitude: 1,200 –35,000 AGL Certified Altitude: 35,000 MSL Approximate Cruise Speed: 310 knots	
Cessna 414A Chancellor III	Twin-Piston Pressurized	Flight Range: 900 nm Altitude: 1,200 –25,000 AGL Certified Altitude: 30,200 MSL Approximate Cruise Speed: 235knots	

** RVSM: Reduced Vertical Separation Module. This FAA-certified equipment allows operation above 28,000' (MSL).*

The Cessna 441 (Conquest) aircraft are the highest performance and most versatile aircraft in the fleet for imagery acquisition operations. They can host all of Surdex's imaging systems and can fly nearly as slow as our smaller aircraft as well as being the fastest in our fleet. Most importantly, the RVSM equipment and advanced radar allow us to ferry it safely at night, while most piston aircraft are ferried during daylight hours. With its ability to quickly move across the country, the Conquests often handle the widely diverse projects during the hectic spring flying season.

Surdex performs inspection, maintenance, and repair in-house.

Our aircraft are housed in our 30,000 square feet hangar at Spirit of St. Louis Airport, only blocks from Surdex's headquarters in the St. Louis area. With our centralized position, we can efficiently handle projects throughout North America.

Surdex has a full-time aircraft maintenance staff certified for A&P (Aircraft and Powerplant) to support our fleet. This staff is qualified and certified to perform FAA-mandated inspections, maintenance, and repair. Thus, we are not reliant on the schedule and cost of third parties. We have even transported maintenance personnel to project areas to perform inspection, maintenance, or repair in the field.

2.2.2.3 Project Control and Flight Design

The design of a project includes the key parameters of:

- The project boundary, defined by the deliverable orthoimage tiles.
- A ground control point design.
- The flight design.

Surdex performs and initial design of the project and submits it for review by the client. In most cases, this is the subject of discussion at a Project Kick-Off Meeting. Once refined to the final design, all ground and aerial data collection follows this plan throughout the project. The design can be documented with shapefiles and/or map plots.

Upon successful award, we will discuss with the Consortium the need for any additional flight lines required to reduce building lean in areas with tall buildings.

Surdex will undertake the ground survey design and operations for the project. All related work will be done under the direct supervision of a Registered Land Surveyor and reviewed by a Certified Photogrammetrist. Our survey will include photo-identifiable and paneled control as well as check points to be used for independent assessment of aerotriangulation and product accuracy.

The flight design is driven by several key parameters and may entail multiple imagery resolutions, separate areas of interest (AOI), and areas of modified forward or side lap to handle such situations as "urban canyons."

Flight Design Parameters	
Parameter	**Value**
Resolution (GSD, Ground Sample Distance) and flying height (AGL)	Baseline approach: 3": 3,125' AGL 6": 6,250' AGL 12": 12,500' AGL
Flight line orientation	North-south preferred
Stereoscopic buffer either end of flight line	Extended an amount approximately equal to half the width of the nadir array: 3" GSD: ~2,500' 6" GSD: ~5,000' 12" GSD: ~10,000'
Stereoscopic buffer lateral to project boundary	Equivalent to sidelap
Side lap	Minimum 30%

Our response includes our preliminary flight and ground control plan. It is submitted in digital (shapefile and PDF) format on separate media. Note that a number of 6" resolution areas are also overflown at 12" resolution because it is inefficient to break lines. This also aids the aerotriangulation process by using large by providing large, contiguous blocks of imagery for continuity.

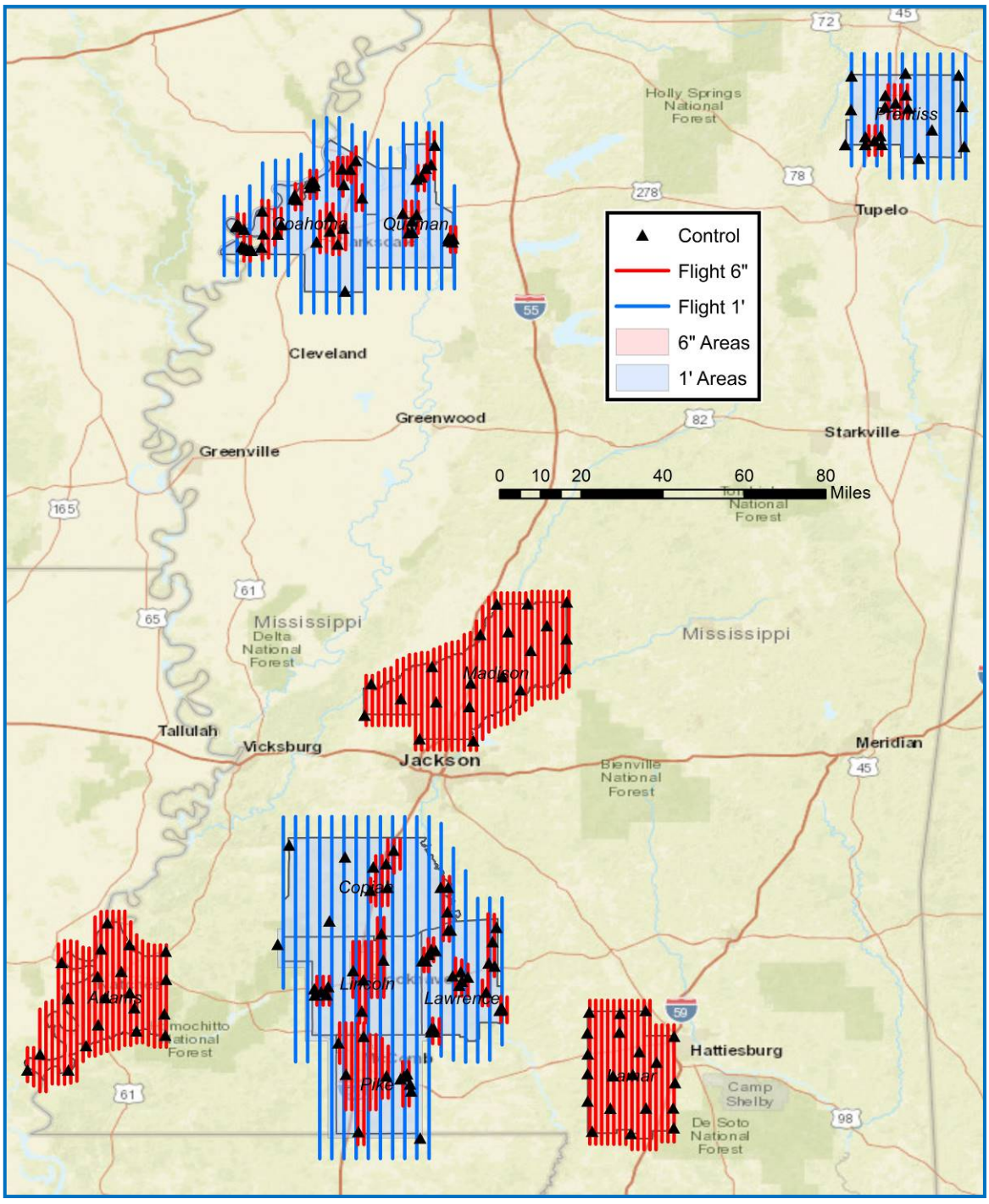
The following table presents preliminary estimates derived from the flight plan.

Flight Design Overview			
Resolution	**Flight Lines**	**Flight Line Miles (FLM)**	**On-Line Hours**
6”	156	2,874	33.1
12”	48	2,247	15.1
Baseline Totals	**204**	**5,121**	**48.2**

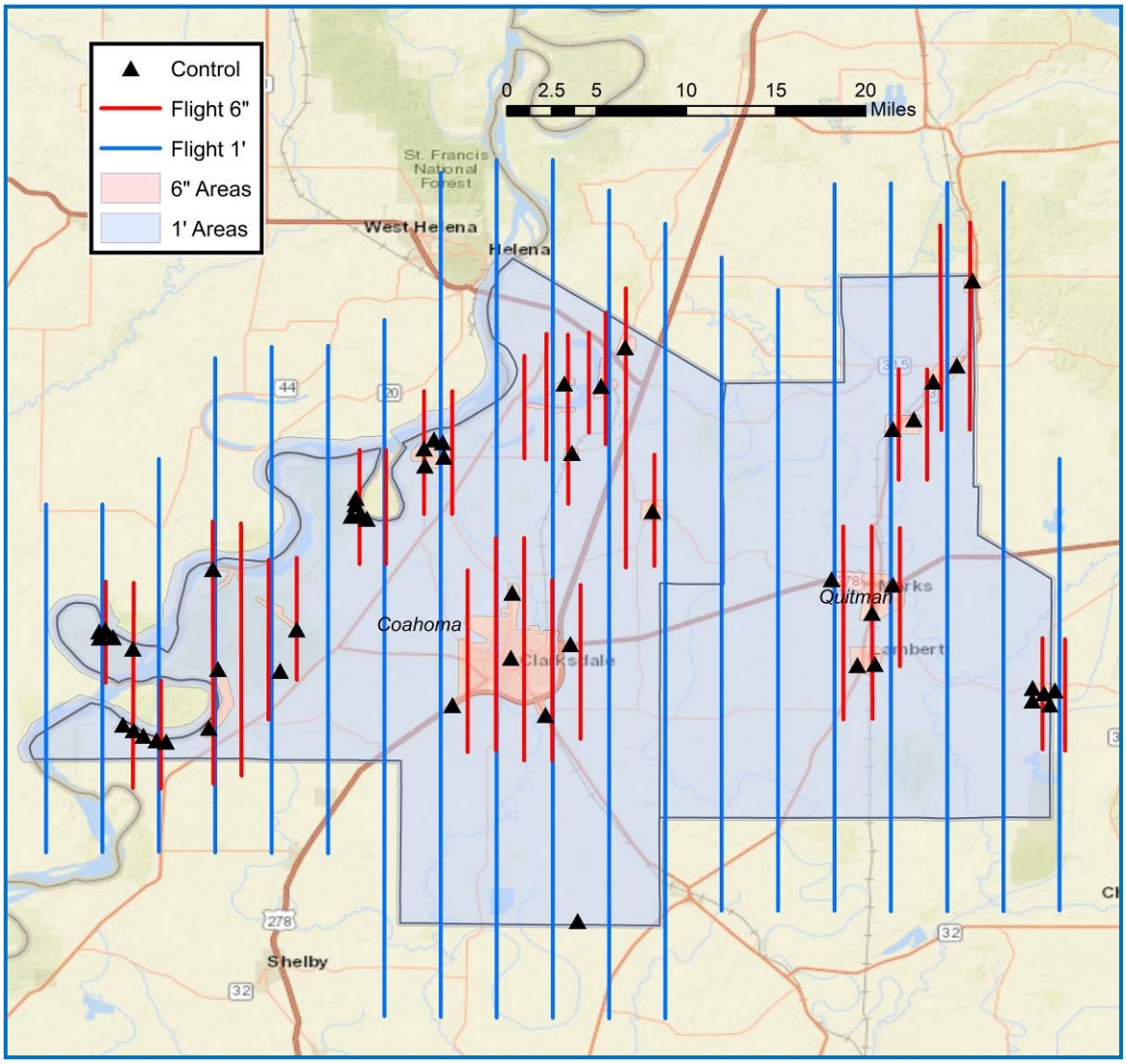
The following pages portray the baseline flight and control plans in a piecemeal fashion to allow cluttering. We have broken down these portrayals and the nomenclature for the provided flight plans as follows. Provided in the hard copies of our proposal, in Section 8 Additional Information, we have provided Flight and Control plans printed on larger paper and provided on the USB with our Samples.

Planned Areas	
Area	**Counties**
1	Coahoma, Quitman
2	Prentiss
3	Madison
4	Adams
5	Copiah, Lincoln, Lawrence, Pike
6	Lamar

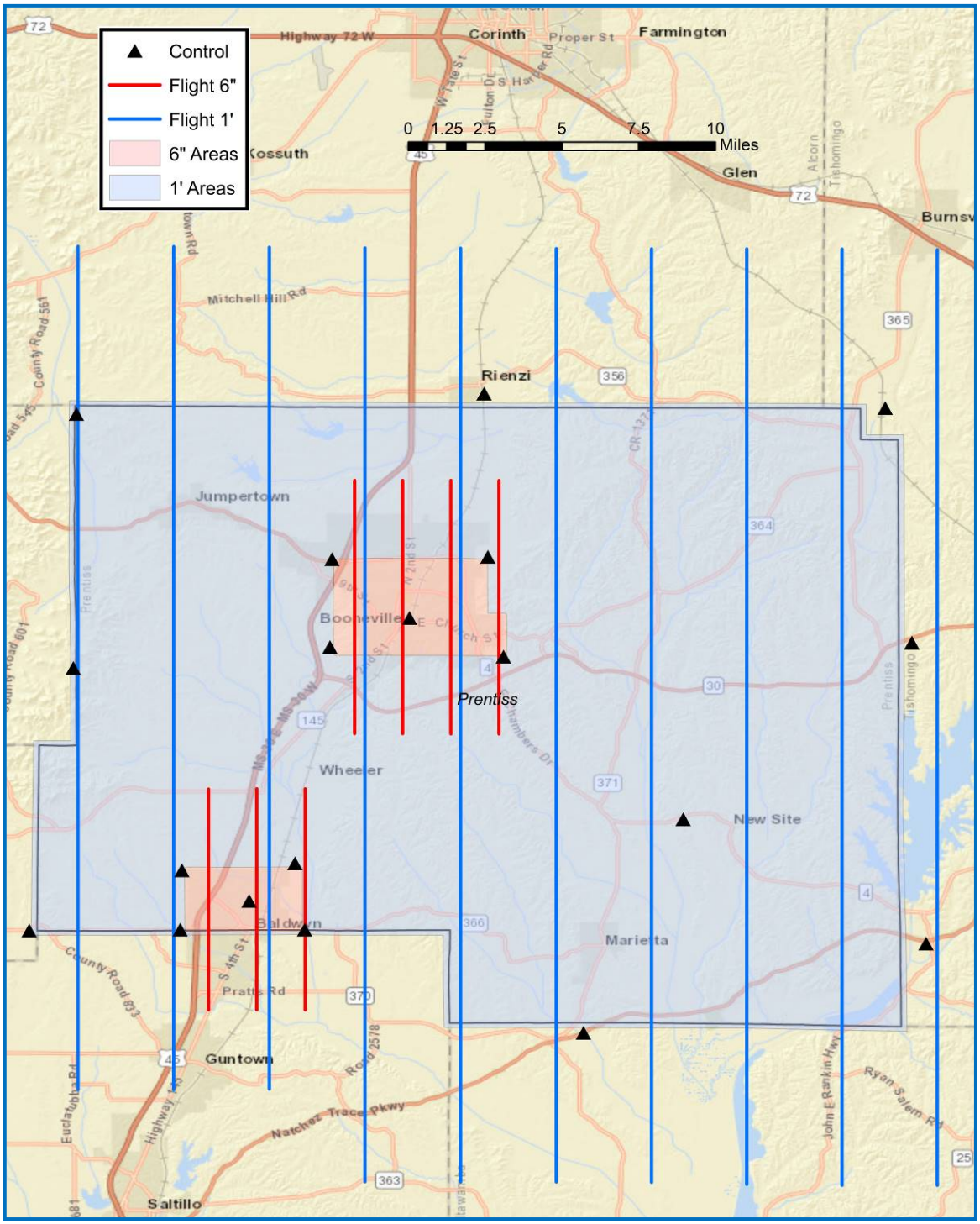
Preliminary flight plan for project



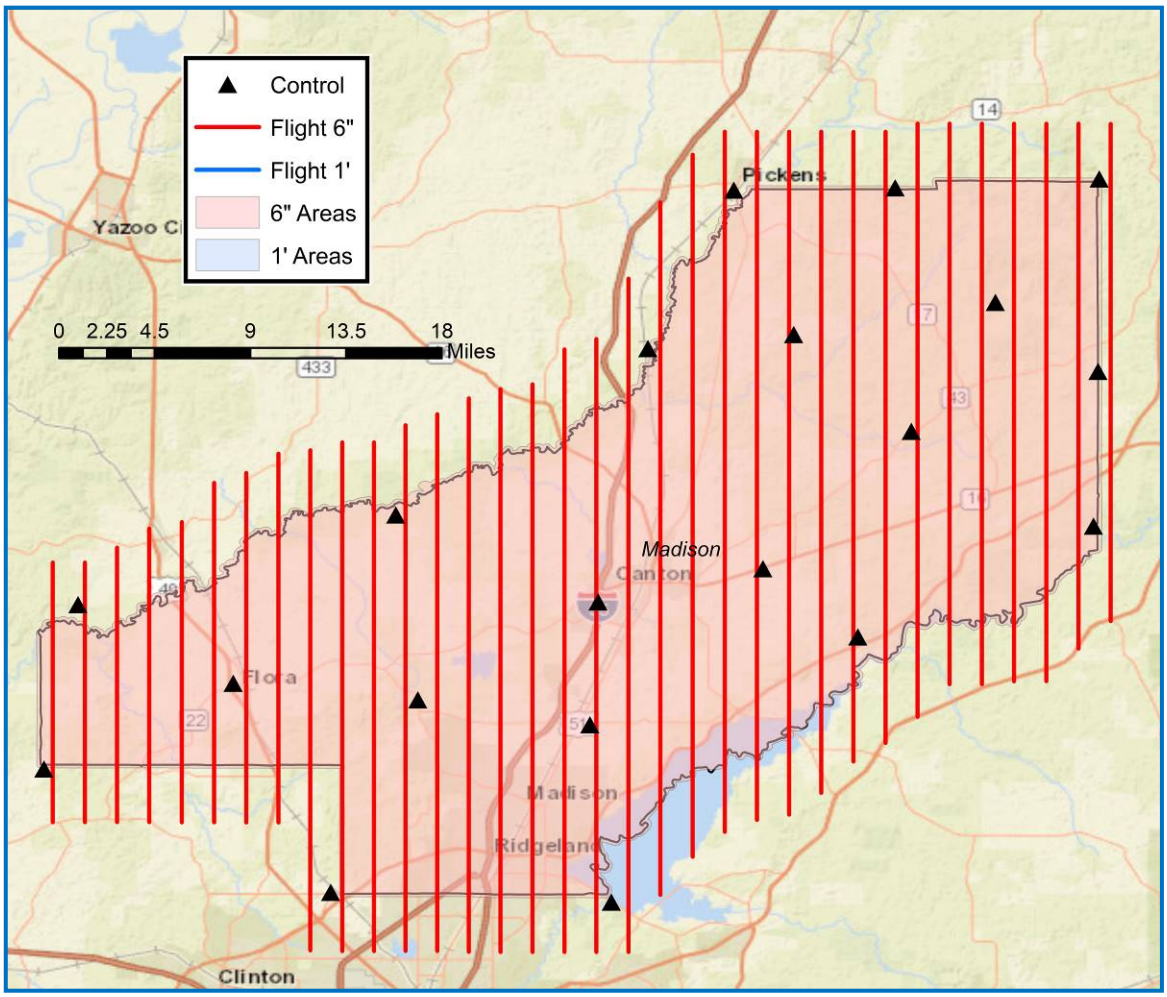
Preliminary flight plan for Area 1



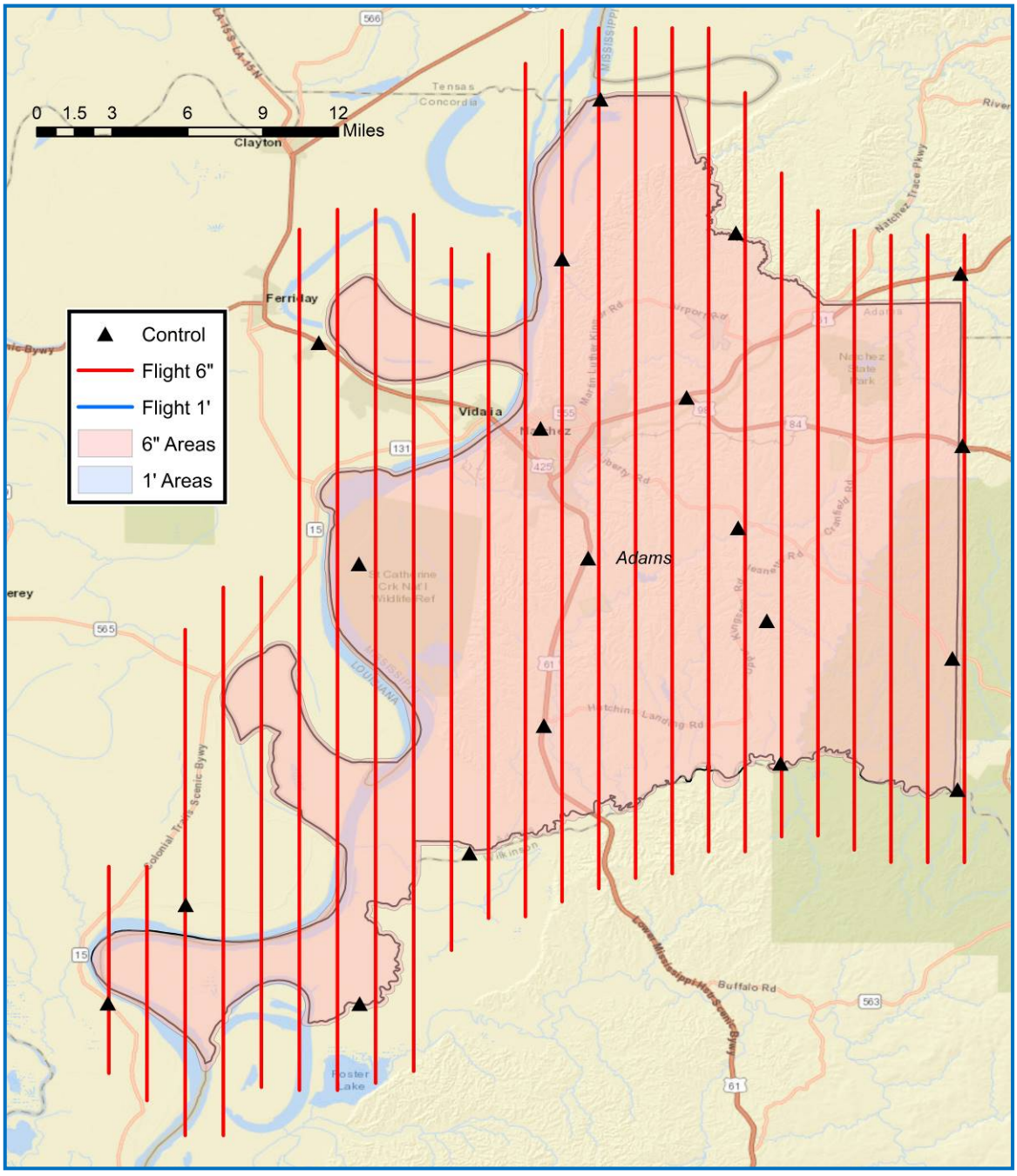
Preliminary flight plan for Area 2



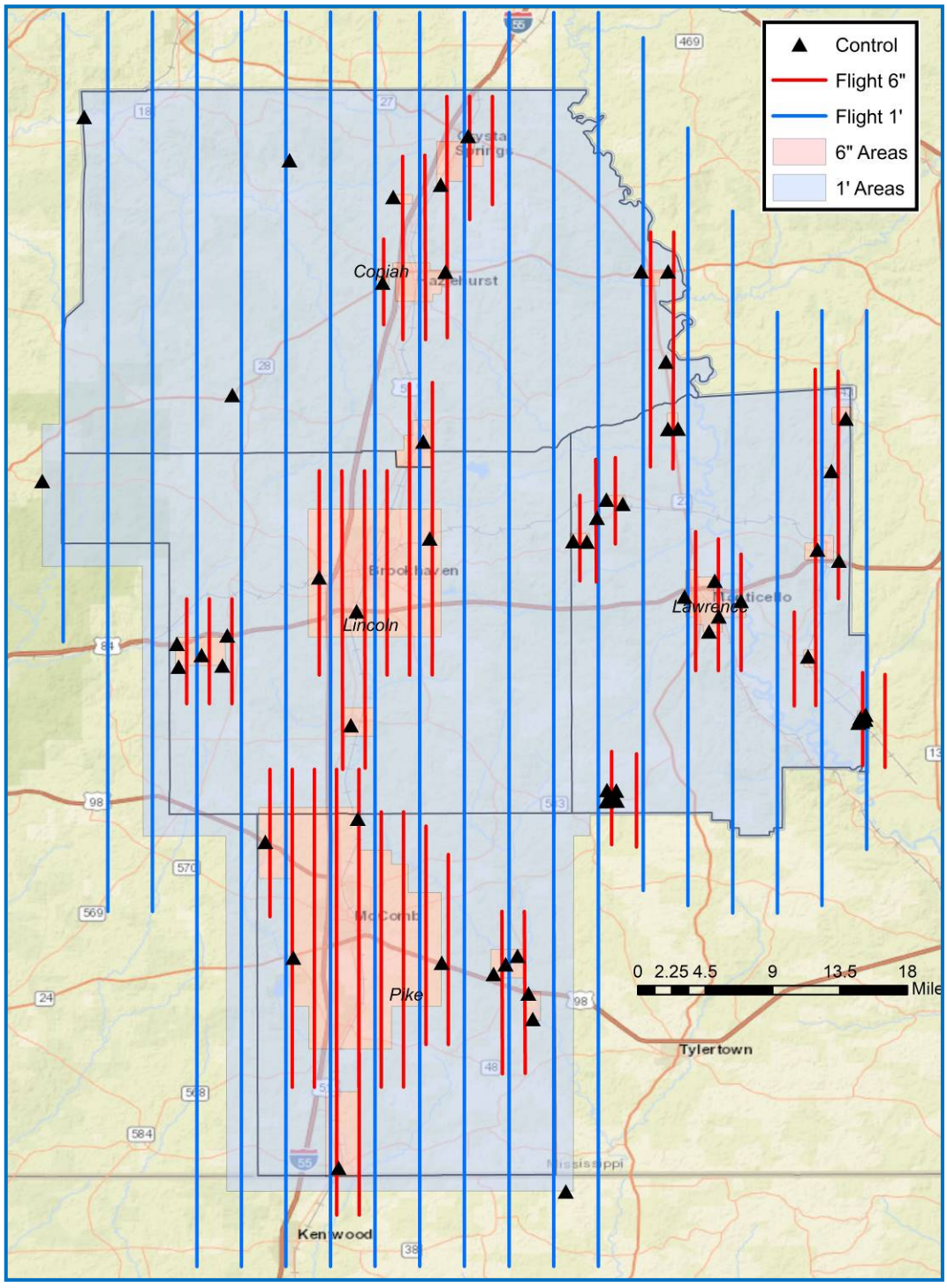
Preliminary flight plan for Area 3



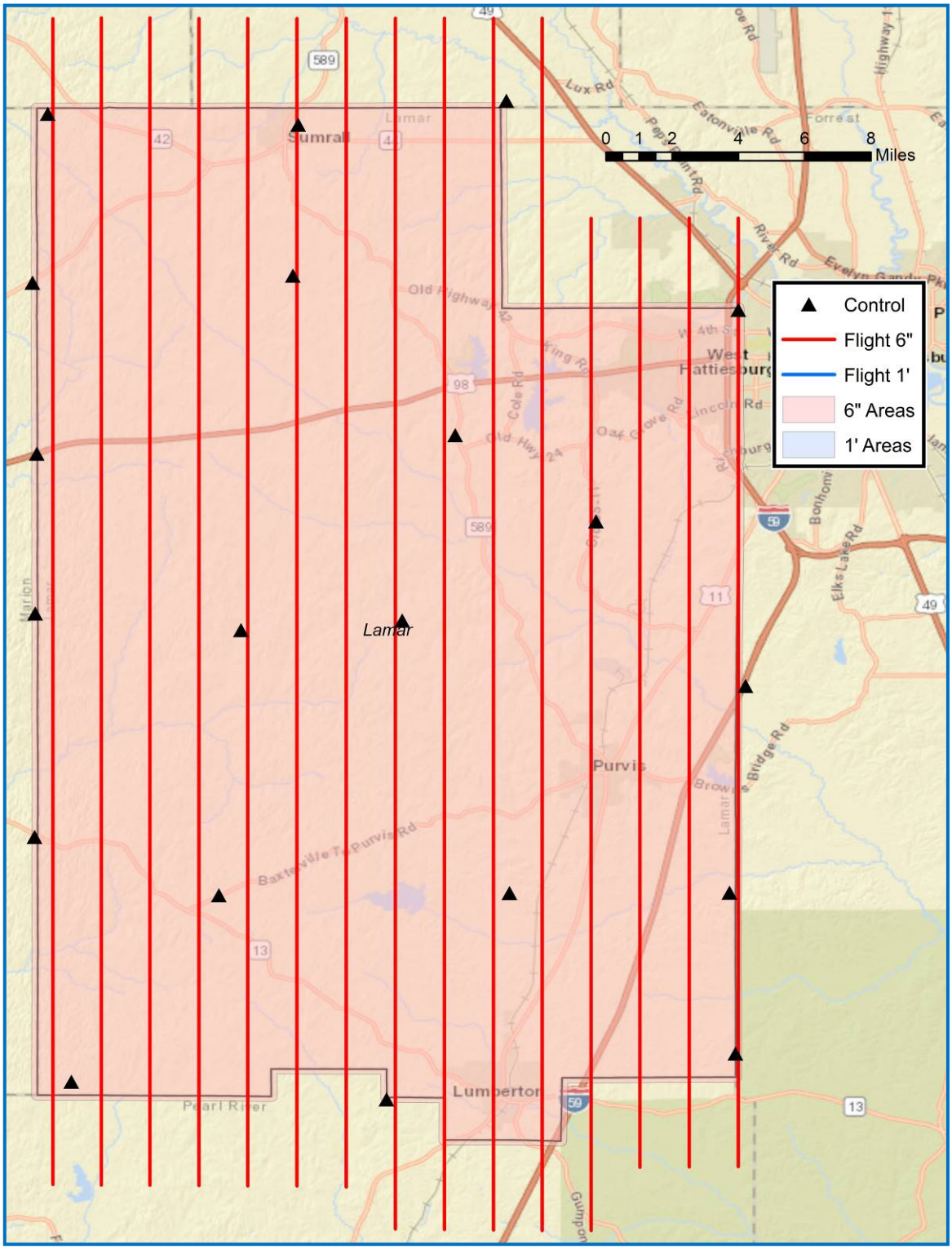
Preliminary flight plan for Area 4



Preliminary flight plan for Area 5



Preliminary flight plan for Area 6



2.2.2.4 Acquisition Approach

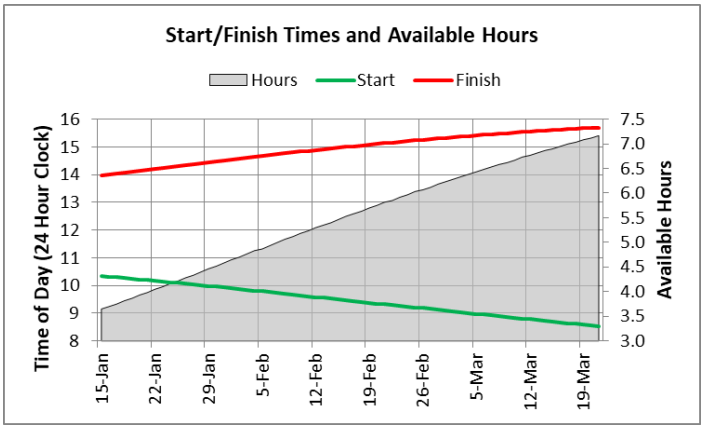
Surdex is widely acknowledged by both our clients and our colleagues as having a well-earned reputation for successful and timely acquisition of the imagery – the most critical phase of every project. We have a robust approach that emphasizes coordination between our staff and our clients as well as optimal balancing of our resources to ensure this phase is correctly executed. Although in many cases we use our own aircraft and sensors, we have coordinated efforts as large as a dozen subcontractor aircraft for a single project.

Surdex's Acquisition Approach	
Feature	**Benefit**
Strong coordination with the client: (1) Start and stop acquisition timeframe. (2) Movement to/from the project area. (3) Adherence to client specifications on window, sun angle, etc.	Clients are always aware of our presence on their project.
Coordination with FAA and military operations centers if required. Surdex has successfully operated in some of the most highly sensitive airspaces in the US and Canada.	Assure clients of trouble-free access to restricted or military operations areas.
Monitoring of short and long term weather: (1) Use of weather resources. (2) Enterprise database retains weather reports at each project site during each acquisition window.	Achieves optimal utilization of resources to ensure success for all projects.
Near real-time reporting of status – acquisition and results of inspection.	Clients continuously aware of their project's progress.
Minimize the acquisition window length – oftentimes by putting multiple aircraft on the project. This minimizes the effects of weather and climate on image appearance.	Highest possible image quality across the entire project.
Our large fleet of aircraft and sensors	Ability to handle numerous projects across North America.
Our Enterprise database tracks all acquisition and inspection status: (1) Real-time tracking of our aircraft to monitor acquisition operations. (2) Flight plans updated daily. (3) Re-flights prioritized to ensure minimal time difference. (4) Daily issuance of status.	Maximum application of resources to ensure success.

2.2.2.5 Acquisition Workload

The following graphic portrays the acquisition period for the project against the start and finish times each day (governed by the minimum allowable sun angle) and the "net" available acquisition hours each day. Based on our prior three projects for the consortium, it is anticipated that the acquisition timeframe would be approximately mid-January through 21 March.

Available imagery acquisition hours for the project.



Summary of Available Hours for the Flight Season					
Sun Angle	Days	Minimum Hours	Maximum Hours	Average Hours	Total Hours
30°	66	3.7	7.2	5.5	362.8

Based on experience and local historical information:

- An average acquisition day nets approximately 4 hours of acquisition for a single aircraft.
- Historically, acquisition occurs in approximately 25% of days in the window – or ~16 days in this case.

Based on this, the following resource assessment can be performed:

- The total available hours are 16 days at 4 hours each day or 48 total hours for a single aircraft.
- With approximately 48 planned hours, this amounts to 48 / 4 or 12 days for a single aircraft.
- By using two (2) aircraft, this will be reduced to 6 days.

We are confident that only two (2) aircraft are needed to capture the desired area. Surdex has additional aircraft and sensors readily available should any unforeseen circumstance, such as unusually poor weather, reduce the number of suitable acquisition days. For example, during the Mississippi 2014 project, Surdex used three ADS100s and acquired 39% of the total project area in the final 3 days of the acquisition window.

2.2.2.6 Daily Operations

Before each acquisition day, a number of activities are undertaken by the aircrew:

- Aircraft, ABGPS, IMU, and camera are all inspected for proper operation.
- Final weather checks are made.
- Up-to-date flight plans are downloaded and reviewed.
- Flight plans are filed with the local airport/FAA.
- If required, base stations are setup.

At the end of each acquisition day:

- Aircraft, ABGPS, IMU, and camera are all inspected for proper operation.
- Aircraft flight logs are completed.
- Flight reports, in Surdex format, are completed.
- If necessary, imagery and data transferred from on-board storage to “transfer” hard drives.
- If appropriate, transfer drives are shipped priority overnight to the production center.
- Flight logs are emailed or faxed to the production center.

The results of each day’s effort are used at the production center to update flight plans for the next day. Not only are the acquisition results used to modify the next flight plan, but results of inspection are combined to form a complete view of the acquisition status.

Surdex maintains a flight report for each mission that is used by the production center to appraise the results. For example, if extreme turbulence or cloud cover is cited by the aircrew for specific areas of the acquisition, prioritized attention is paid to these areas by the inspectors.

For flights involving restricted airspaces and/or Military Operations Areas (MOAs), extreme coordination with the Air Traffic Control centers and often military operations centers is required. In such cases, Surdex proactively provides the necessary information, including flight plans, to the proper authorities to ensure trouble-free access to the areas. Surdex has performed acquisition in and around highly sensitive airspaces, such as White Sands Missile Range (New Mexico), Nellis Air Force Base (Nevada), and the Washington, DC ADIZ (Air Defense Identification Zone). Experience has shown that high degrees of communication and adherence to directives results in long term success. In some cases, this has even required the presence of a government official on the aircraft.

It is critical to collect ABGPS/IMU data with the highest possible integrity, taking into account such factors as:

- Operation of base stations to maintain a reasonable distance from the aircraft to the base stations.
- Avoiding IMU drift by limiting the length of lines – generally less than 30 minutes.
- Using CORS (Continuously Operating Reference Stations) and/or local GPS reference networks to provide multiple observations.

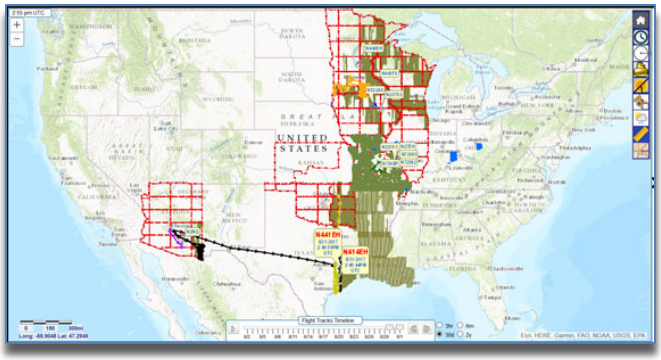
2.2.2.7 Tracking Operations

Each of Surdex's aircraft is equipped with tracker that uses GPS and a satellite uplink to continuously report the position, airspeed, and altitude of an aircraft. On large projects, such as the USDA National Agriculture Imagery Program (NAIP), subcontractors are often equipped with a tracker to provide a view of the entire project. To provide redundancy and more frequent course updates, the tracker positions are blended with a stream of positions from broadcast from the ADS-B radio and forwarded through a web tracking service. This information is conveyed through a web interface and/or Sharepoint site. Blending the tracker data that transmits from takeoff to landing with the higher fidelity ADS-B stream provides a flight path for the full flight. As a result, it is clear whether the aircraft is over the project area, headed to the site, returning from the site, acquiring airborne data, or stationed at a local airport. Overlay of restricted airspace, weather, remaining flight lines, prior GPS bases, CORS stations, etc. provide a means to manage the fleet of aircraft

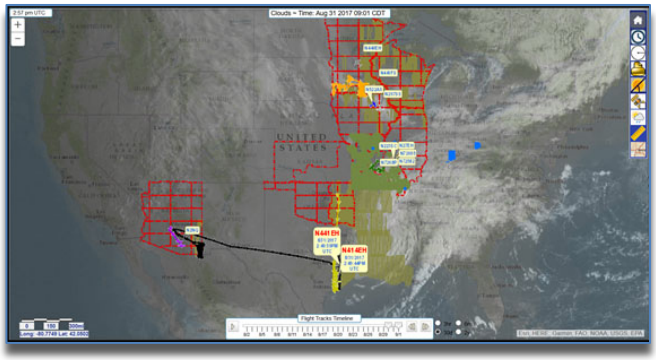
Surdex has customized internal applications that allow the viewing of the aircraft status in various ways, providing alerts to Project Managers when aircraft appear to be working on their project. Overlay of restricted airspace, weather, remaining flight lines, prior GPS bases, GPS CORS provide a single view to manage the fleet of aircraft.

Basic view (30 days) showing active projects, active aircraft, acquisition remaining

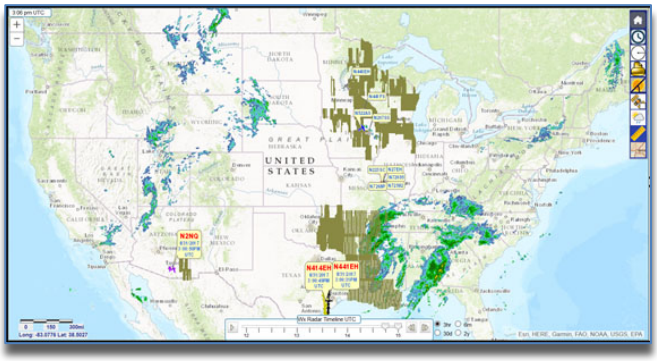
Default view



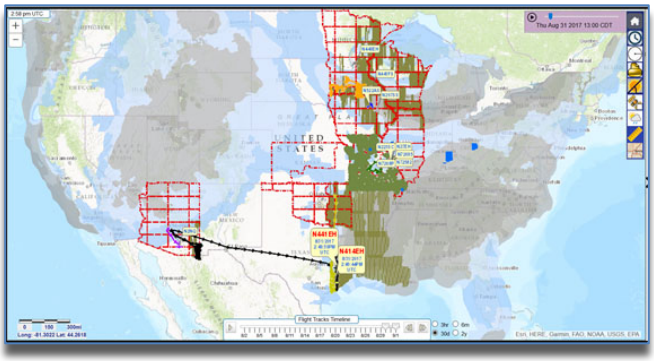
Basic view with cloud cover



Basic view with weather radar



Basic view with sky forecast



2.2.2.8 Sample Exploitation Imagery

Shortly after acquisition begins, Surdex will work with the consortium to find representative regions in the project area and produce sample exploitation imagery. Using these "reference images" over these regions, Surdex will process the images to basic image metrics and expert judgment. These reference images will be submitted for review by the client and, if necessary, their colorimetry altered to meet the expectations for the project. Once agreed upon, these will be used to target all image processing until a "pilot" deliverable is used to finalize the appearance with the participation of the client. Since all data is retained in 12 bits/pixel format, final appearances can still be modified to large extent after the pilot project is agreed upon.

2.2.2.9 Re-flights

All re-fights are at the expense of Surdex and will be taken with the same camera system whenever possible. If during inspection a re-flight is found to be necessary, it is immediately prioritized for re-capture.

2.2.2.10 Crab

Although imagery from pushbroom systems such as the ADS100 is less affected by crab, flight lines exceeding the stated limits will be brought to the attention of the consortium. If it is desired that such lines be re-acquired, they will be scheduled for re-flight.

2.2.2.11 Forward and Side Overlap

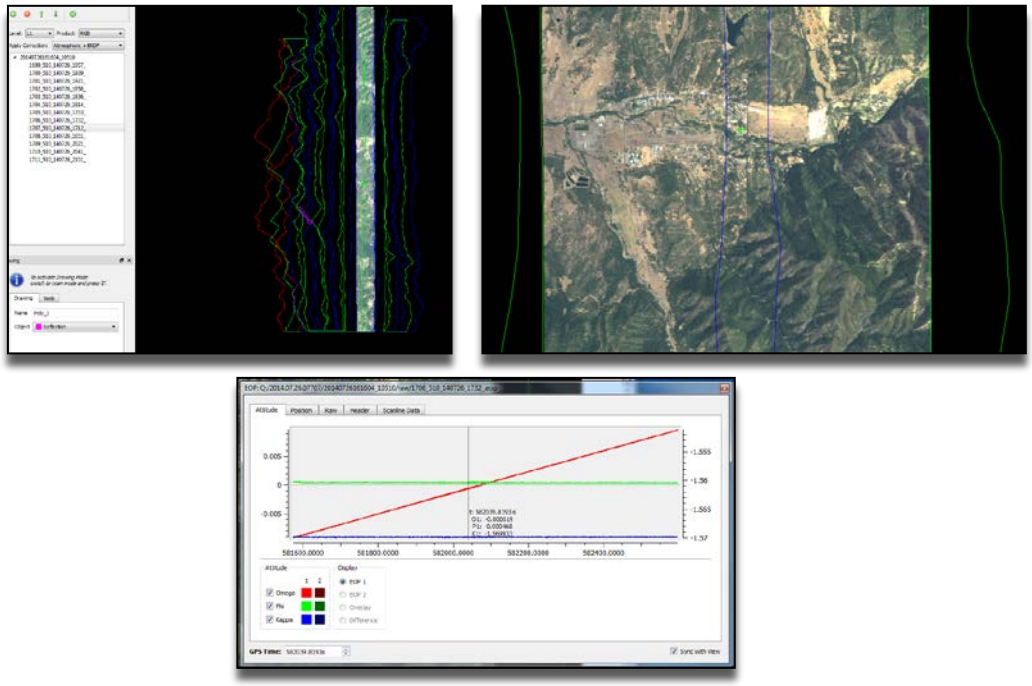
The stated specifications for forward overlap do not apply to pushbroom systems such as the ADS100, which constantly images forward, aft, and nadir to form stereoscopic coverage.

2.2.2.12 Image Inspection

The inspection of acquired imagery and associated data is critical to the overall success of an orthoimagery project. Because of this, imagery inspection is based on 100% inspection— all imagery is viewed and graded, and the results are stored in an Enterprise database available to all personnel in production. Inspection is treated as a high-priority activity so as to isolate any re-flights as quickly as possible.

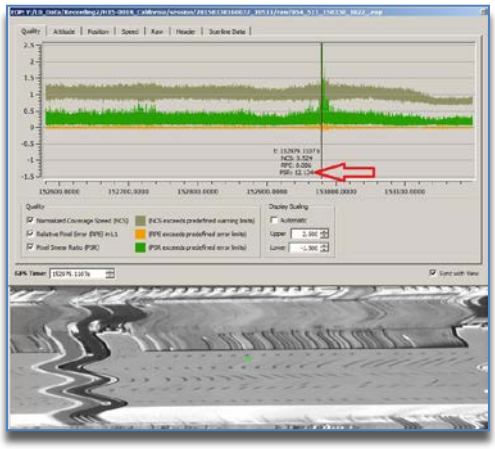
Imagery Inspection		
Task/Item	**Inspection Method**	**QA / QC**
ABGPS/IMU processing	Analytical and visual	Performed and reviewed by a CP and/or RLS
Acquisition height within 5% of plan	Analytical	Automatic verification via Enterprise database
Sun angle	Analytical	
Forward lap	Analytical	
Sidelap	Analytical	
Crab	Analytical	
Tilt	Analytical	
Cloud/cloud shadow	Visual	May be cause for rejection and re-flight
Smoke/haze	Visual	
Excessive flooding/standing water	Visual	
Excessive ice/snow	Visual	
Image motion	Visual	
Pixel/band registration	Analytical and visual	
Specular reflection	Visual	
Camera misfire	Analytical and visual	
Specular reflection	Visual	Delineated for use in orthoimagery production process

ADS100 imagery inspection interface.



As with any pushbroom sensor, care must be taken to acquire and inspect imagery for possible image blur caused by turbulence. In late 2014, Leica supplied Surdex with a software tool that aids in locating areas of potential blur for close inspection. This tool, coupled with aircrew awareness of turbulence effects and flight reports quantifying any turbulence, allow us to focus our imagery inspection to isolate and expedite potential re-flights.

Leica Blur Tool Showing Potential Turbulence-Induced Blur Graph and Corresponding Image Blur during Inspection.



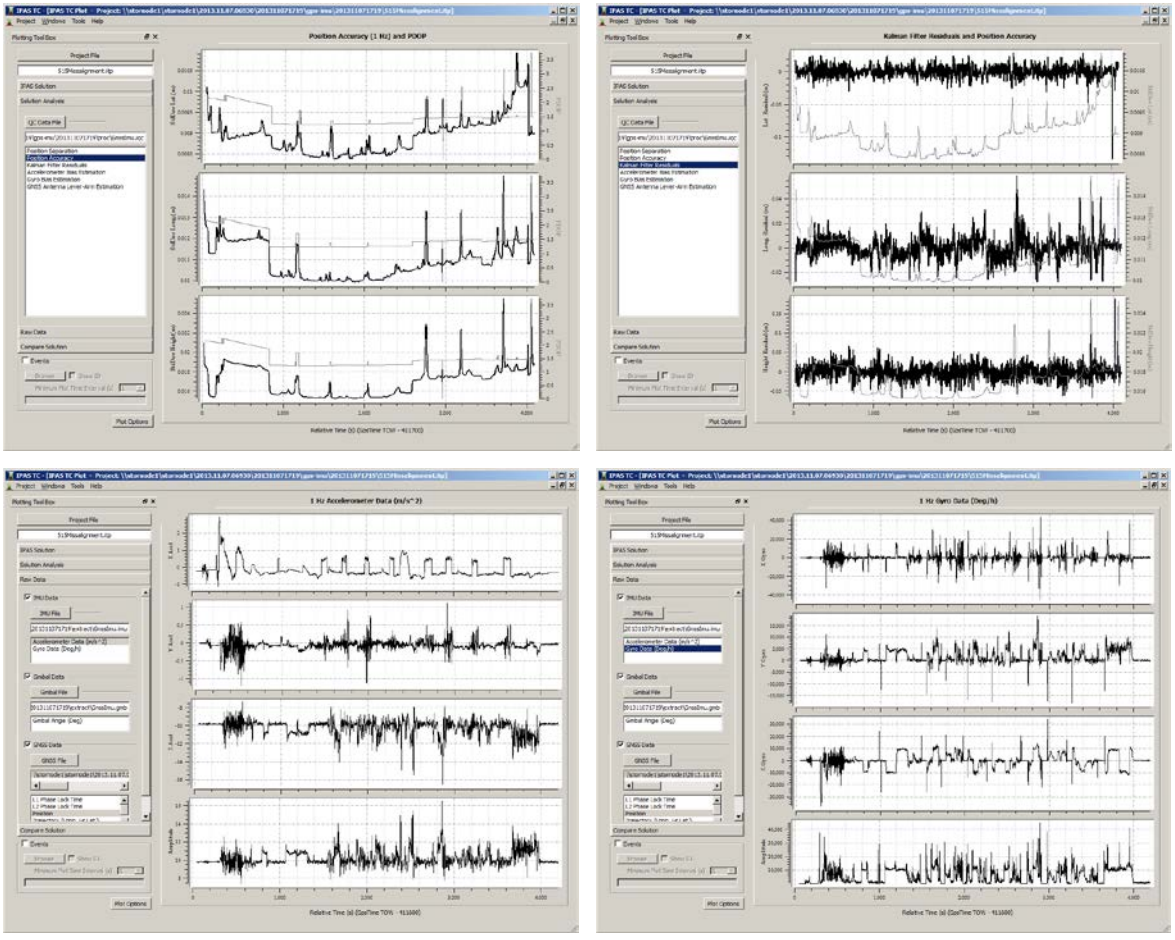
2.2.2.13 Description of Methodology

Detailed descriptions of the methodology are addressed under the pertinent sections throughout this response.

2.2.3 Airborne GPS-IMU

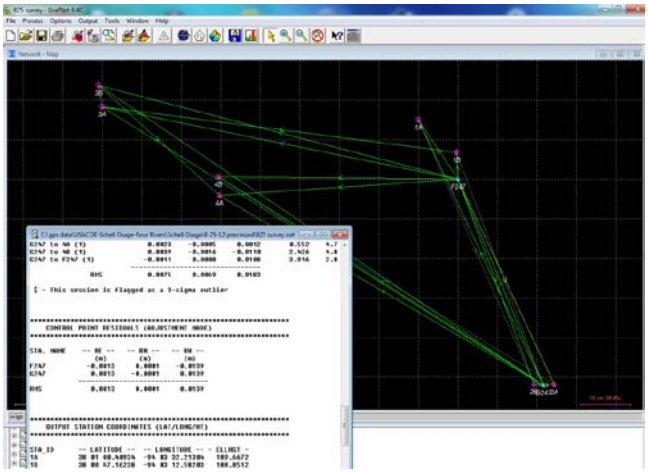
Surdex uses the standard Leica workflow to capture and process the GPS and IMU data. ADS100 sensors carry the Novatel SPAN GPS/GNNS inertial navigation system in the aircraft. Surdex uses Trimble R8 model receivers to collect ground base station GPS and GLONASS data during each flight. The position of the ADS100 sensor and the GPS antenna are measured within the coordinate system defined by the central axis of airplane. These measurements along with the GPS and IMU data captured on each flight are processed using Leica IPAS TC software. Leica IPAS produces a differential solution for the airborne positions and attitude more than a hundred times a second for the duration of the flight. As the Leica ADS100 is a line scanner there are no individual stations, but rather a stream of epochs or fixes are produced at a rate of 128 per second. Only during aerial triangulation are discrete fixes calculated at a spacing dictated by image measurement density.

IPAS TC displays a number of charts and tabular data that allow the survey technician to analyze the trajectory solution. This includes positional accuracy.



2.2.4 Ground Control

Survey control points.



As shown in our preliminary design provided with this response, we propose the use of 190 control points.

All survey operations will be conducted under the supervision of a Registered Land Surveyor. Survey grade GPS units will be used and the solution based on the OPUS (Online Positioning User Service) service provided by the National Geodetic Survey. In summary:

- All adjustments will be made in the project reference frames.
- A sketch will be provided for each point along with at least two (2) pictures of the location to guide measurement of the points during aerotriangulation and orthophoto accuracy assessment.
- A final control diagram will be furnished for all survey points utilized on this effort. This will include point positions and observed baselines designating beginning and ending points.
- A least squares adjustment will be performed for all control points. Output to be furnished in Excel format will include results of the constrained and unconstrained adjustment. This will include fixed coordinates and adjusted coordinates in U.S. Feet, error ellipse values in Meters, relative baseline error ellipses in Meters, precision of the observed baselines in ppm, and redundancy expressed as degrees of freedom. All information will be referenced to field notebooks.
- All field notes and observation logs will be neatly kept and indexed. This includes notes pertaining to the establishment and/or extension of control. For recovered points, information on the condition of each point will be provided in the notes. The observation logs for each point will include all information pertinent to the recovery and observations required for reduction.

Our proposed ground control is illustrated in the flight plan which appears earlier in this proposal.

2.2.5 Analytical Aero-triangulation

Since aerotriangulation (AT) provides the foundation accuracy for the project, it involves checks and balances to ensure accurate results are provided to production process to avoid costly and time-consuming re-work. The inputs to AT are:

- ABGPS/IMU data, including results of the “boresighting” of the sensor (relative position of the lens to the GPS antennas and relative orientation to the IMU) and synchronization with the ABGPS signal.
- The imagery.
- Ground control points and any check points.

The AT process involves:

- Automated measurement of pass and tie points appearing in the overlaps of the imagery.
- Interactive editing of pass and tie points.
- Measurement of control and check points.
- Solution of the refined imagery position and attitude as well as all point positions.
- If required, re-measurement of points and repetition of the solution.

The AT solution is based on a sophisticated "bundle adjustment" employing a mathematical model of the imaging geometry. The bundle adjustment relies on the use of far more "observations" (observed/recorded values such as ABGPS, IMU, ground control, and image measurements) than are required for a unique solution. This is dealt with using a least squares optimization approach in which each observation is "weighted" based on its estimated accuracy. Careful inspection is made of the various "residuals" (differences between observed and adjusted values of parameters) reported by the solution. For example, should an ABGPS observed position differ from the adjusted value by a significant amount, this may signal flawed ABGPS data or processing. Since ground points involve measurements on numerous images, their ground positions and image measurements also have associated residuals. From a high level viewpoint, the ABGPS/IMU and any ground control point data provide a rigid solution that is used to refine initial imagery position and attitude to achieve the required accuracy.

Analysis of the quality of the AT solution is performed by a Certified Photogrammetrist who is highly skilled and experienced with the process. Upon the completion of the AT process, the results are stored in the Enterprise Database and published ("exposed") for use in the following production steps. For orthoimagery projects AT points are compared to the elevation model after the AT is finalized. Although a small percent of the automatically generated points are not on the ground (bare earth) surface, the majority provide a very good check on (1) the fit of the AT and (2) the general quality of the elevation model. This comparison can be useful in isolating updates required to the elevation model.

There are several types of points that are measured during the AT process:

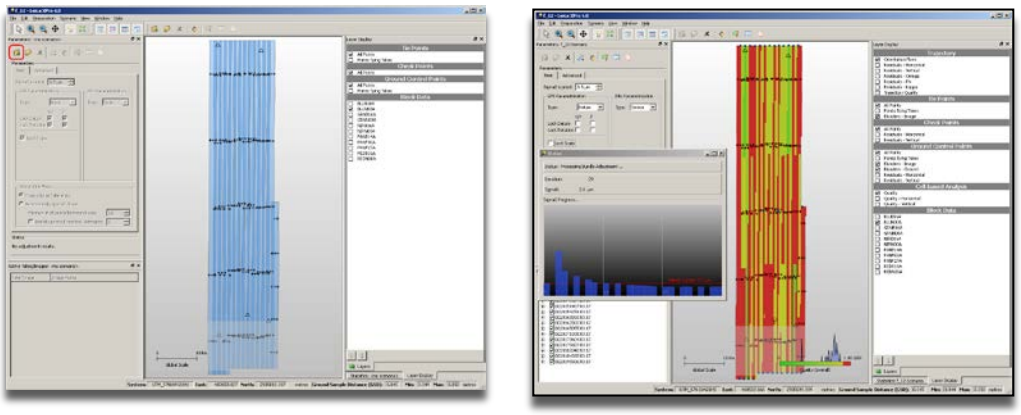
Aerotriangulation Points Type		
Type	**Description**	**Measurement**
Tie points	Points collected in overlapping images along a flight line/strip of imagery. Used to ensure images in the strip are tied together.	Mostly automatically collected and measured, but may require manual collection and/or editing in difficult areas (dense vegetation, water bodies, etc.).
Pass points	Points collected in overlapping images in adjoining and overlapping flight lines/strips. Ensures adjoining strips are tied together. Pass points are often also tie points so as to strengthen the overall solution.	
Control points	Points of known ground position. Often paneled for recognition and accurate measurement. Manually measured.	Manually measured.
Check points	Points of known ground position. Often paneled for recognition and accurate measurement. Not held to their known position during the AT adjustment process. By allowing their positions to "float", they provide an independent check on the accuracy of the AT.	

The Leica XPro software is used to triangulate ADS100 imagery. It is important to point out that the forward, nadir, and aft arrays of the camera essentially form three separate images of the strip. Thus, the pushbroom scanner is analogous to a frame camera in that all points are imaged in three-way stereoscopic views. Leica's Orima software is used to perform the bundle adjustment in several steps:

- Pass points are automatically collected along strips that tie the nadir, forward, and aft arrays to one another, generally resulting in 3 measurements for each.
- Tie points are automatically collected between strips of images to tie them together and/or pass points transferred from one strip to another. As a result, tie points generally involve at least 6 measurements.
- Ground control points are interactively measured.
- The bundle adjustment is performed with automated review and manual edit of suspect pass, tie, or control points.

Aerotriangulation of pushbroom imagery is simplified over the aerotriangulation of frame imagery. There are fewer images from a logistic standpoint, simplifying the amount of automatic matching and manual editing that must be performed. Additionally, the trajectory model ensures cohesive and accurate results within each strip.

Leica XPro ADS100 aerotriangulation interfaces.



Surdex provides a standard aerotriangulation report at the completion of each project. It has proven to be easily tailored to the requirements of each project.

Surdex's Standard Aerotriangulation Report	
Item	**Description**
Reference frame	Definition of coordinate reference frame used for the aerotriangulation, to include map projection, horizontal datum, vertical datum, linear units (U.S. Survey Feet, Meters, etc.).
Flight line indexes	Shapefile and/or graphical plot illustrating the imagery coverage against the project area. *(1)* For frame imagery, exposure stations represented as points. *(2)* For pushbroom imagery, the flight lines represented by polylines between the start and stop of imaging.
Point index	Shapefile and/or graphical plot illustrating the points used in the bundle adjustment, their type, and their identifier.
Weight values	List of weights (standard errors) assigned to all parameters.
Sigma naught (σ_0)	Fundamental single value that expresses the accuracy of the least squares bundle adjustment. Usually reported in microns or pixels and is on the order of 0.1-0.3 pixels.
Standard errors of control points	X,Y,Z standard errors of control points as reported by the bundle adjustment.
Final adjustment of control points	List of control points and a priori and final positions (X,Y,Z).
Identification of points removed from the bundle adjustment.	Points (any type) removed from the bundle adjustment and reasons why this action was taken.
Residual summaries: *(1)* Points (by type) *(2)* Measurements *(3)* Camera positions (frame) *(4)* Trajectory (pushbroom)	Summary of RMSE (Root Mean Square Error) values and estimated accuracy as reported by the bundle adjustment.
Narrative	Summary of software used for the measurement of points and bundle adjustment, issues encountered, etc.

2.2.6 Methodology & QA/QC

This section addresses our QA/QC approach, with detailed methodology for the production phases addressed in the appropriate sections that follow.

Surdex employs numerous checks throughout the critical aerotriangulation (AT) phase. These include, but are not limited to:

- Each AT block is independently reviewed by a Certified Photogrammetrist not involved in the specific block under review.
- Surveyed check points are carried through the AT process as "floating" points (not constrained to their known positions) and these points are checked against the known (surveyed) positions.
- All residuals (sensor position, ground control points, image points) are inspected to ensure they are within the estimated precision of each. This also includes ensuring the "sigma naught" of each bundle adjustment is within statistical norms.
- All AT points (pass, tie, control) are checked against the existing DEM data to search for obvious disjoints with the elevation model. This is sometimes helpful in finding errors in datums, projections, etc. associated with both the AT and the DEM.

Surdex is committed to providing its services "first time right, on time." Surdex's quality process is constantly under review and refinement rather than waiting for wholesale changes if the need arises. Surdex has developed extensive Quality Assurance (QA) and Quality Control (QC) mechanisms for orthoimage projects accuracy and quality are thoroughly reviewed before delivery to our clients.

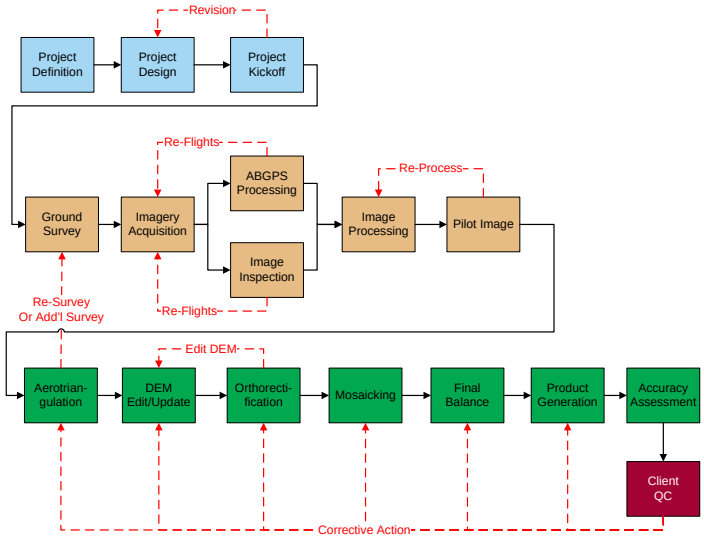
Building upon achieving ISO Certification for specific geospatial products for the National Geospatial-Intelligence Agency, Surdex has embarked on a goal of achieving company-wide ISO Certification by December, 2017. Much work on documentation, such as work instructions, is well underway.

Surdex's personnel have extensive experience and credentials that apply to the QA/QC mechanism:

- Most of our Project Managers (PM) are Certified Photogrammetrists (CP).
- Includes numerous Registered Land Surveyors (RLS).
- Aerotriangulation personnel and/or reviewers include numerous Certified Photogrammetrists.

Our QA/QC mechanism addresses the processes involved in the production of digital orthoimagery. The following figure highlights the key steps in the process. Red flow lines illustrate loop-backs in the process due to rejection/failure of a step.

Surdex's QA / QC process overview.



Summary of QA / QC Phases and Approaches	
Phase	**Approach**
Project design	Internal design reviewed by Project Manager, Certified Photogrammetrist, and Registered Land Surveyor Reviewed by client
Ground survey operations	Field survey operations and processing under the supervision and review of a Registered Land Surveyor
Imagery acquisition	Updating of aircraft inspection, maintenance, and repair prior to and during project Updating of sensor calibrations if required Boresighting of sensors prior to use and/or after installation/re-installation Reporting of detailed progress by each aircrew at end of acquisition day Nightly updating of flight plans incorporating progress and results of inspection
Imagery inspection	100% inspection – each image graded and reported in Enterprise database Inspection against the following factors, at a minimum: • Season window(s) and client start/stop work orders • Sun angle and/or timeframe specifications • Project specifications for ground conditions (flooding, smoke, haze, etc.) • ABGPS/IMU accuracy and quality • Camera misfires • Image motion/smear • Agreement with flight plans • Clouds/cloud shadow • Specular reflection noted for use by ortho technicians • Automated analysis of smear and/or occlusion in rugged terrain for use by ortho technicians
Aerotriangulation	ABGPS/IMU processing reviewed by a Certified Photogrammetrist / Registered Land Surveyor Tailored aerotriangulation reports for client review Dependent upon accuracy requirements, graded against such as: • Ground control, ABGPS/IMU, and image residuals • Agreement with check points • Distribution an placement of pass/tie points in final solution
Elevation modeling	Visual review Comparison of aerotriangulation points to the elevation surface to determine areas of change or problems
Ortho/mosaic	Ortho technicians inspect one another's work and perform edits Depending upon resolution of imagery, planimetric data such as roads, bridges, rail lines, buildings, etc. may be used to focus attention on seamline review/edit
Product QC	Use of pilot project(s) with client to assess: • Color, tone, balance specifications/expectations of client • Form and format of deliverables • Metadata compliance • Accuracy analysis using AccuracyAnalyst

2.3 PHOTOGRAMMETRIC COMPILATION

2.3.1 Digital Terrain Elevation Model

The following table summarizes our understanding of the available LiDAR data based on information presented in RFP Attachment H.

Summary of LiDAR Coverage (From RFP Attachment H)	
County	**Coverage**
Adams	NRCS/MDEQ/3DEP SW MS 2018
Coahoma	COE Delta Phase 1 – 2009
Copiah	3DEP Coop SE 2015
Lamar	MDEQNPS/USGS MS Est Camp Shelby 2016
Lawrence	3DEP Coop SE 2015 & NRCS SE MS 2015
Lincoln	3DEP Coop SE 2015
Madison	MDEQ/FEMA Madison-Yazoo 2012
Pike	3DEP Coop SE 2015
Prentiss	NRCS/TVA/NPS/FEMA Northeast 2016
Quitman	COE Delta Phase 1 – 2009

It appears that the entire area is covered by existing LiDAR data that can be used in the orthoimage production process. Surdex is prepared to update the LiDAR, where needed, to achieve the orthophoto accuracy specifications. Updates or creation of DEM data will be done using either digital correlation (large areas) followed by stereoscopic editing, or simply stereoscopic editing in smaller areas.

The DEM data will be edited in a stereoscopic environment, including new developments, street alignment, drainage modification and large areas of grading. New breaklines will be created and tied to existing breaklines where necessary. Breaklines will be compiled in areas of major relief, drainages, new elevated features and street centerlines as required. Mass spot points will be developed, consistent with existing spacing and density to create an accurate surface model required for orthorectification.

The elevation data will be delivered in a DTM format (mass points plus breaklines) as opposed to a DEM (gridded elevation data set). If significantly large areas need an update, we may undertake digital stereoscopic correlation. However, we believe stereoscopic compilation will be the predominant methodology to update existing data.

Sample Surdex SGM results with ADS100: image drape (left) and color-coded heights (right).

We use several approaches to ensure the elevation model is accurate and current enough to support the digital orthoimage accuracy requirements:

- Visual review of the elevation model for detection of obvious artifacts (e.g.: relief-shaded views, color-coded elevation views, etc.).
- Comparison of aerotriangulation points with the elevation surface.

Of these approaches, the comparison of the aerotriangulation points (control, pass, and tie points) to the elevation model is very helpful in isolating areas of gross change.

The stereoscopic geometry of the ADS100 lends itself well to both automated generation of elevation data and stereocompilation. The Leica Semi-Global Matching (SGM) software has demonstrated very high integrity surface models by essentially matching every pixel in the forward, aft, and nadir arrays to create a photogrammetric point cloud.

2.3.2 Digital Orthophotography

2.3.2.1 Surdex's Orthoimagery Production Process

Surdex's R&D staff has worked diligently over the last decade to improve accuracy, quality, and throughput of digital orthoimagery. This effort has resulted in a mix of third party, open source, and custom-developed algorithms and software. We limit sensor-specific processing to the front-end of the production chain, utilizing source-independent processing to the maximum extent to ensure consistent results, including the mixing of sensor types within a project if allowed by the client. All image resampling is performed using bi-cubic or Lagrange interpolation kernels to eliminate aliasing and similar artifacts.

Features and Benefits of Surdex's Orthoimagery Production Process	
Feature	**Benefit**
Image color, tone, balance, etc. prototyped before production begins in a Pilot Project.	Client participates in desired appearance of final product far in advance of delivery. The pilot project also checks form and format of deliverable imagery, metadata, etc.
All image processing and production performed in "4x12" space (4 bands, 12 bits/pixel) until the cutting of deliverable image tiles: (1) Generate color, 4-band, and/or color infrared (2) 8 or 12/16 bits per pixel deliverables	Preserving full content provides maximum latitude in mosaicking process. Ensures highest possible quality products.
Internal production tiles are in a contiguous (seamless) format, with deliverable tiles generated at the final stage. This supports: (1) Overlapping deliverable tiles (2) Multiple deliverable tile layouts (3) Multiple map projections (4) Multiple product resolutions	Accommodates clients with requirements for multiple layouts of deliverable products at marginal additional cost. Accommodates last-minute changes. Edits to data only done once to support multiple products.
Highly automated absolute radiometry and atmospheric processing, reduces: (1) Level of subjectivity by technicians (2) Production labor effort (3) Changes to be made in final stages of production	Higher volume and throughput.
Customized seamline generation process: (1) Highly effective (2) Inclusion/exclusion areas (such as building footprints)	Seamless final product. Reduced customer review.
Proven ability to incrementally produce large orthoimagery projects while preserving a seamless appearance at completion.	Allows incremental QC and delivery to address client priorities, leveling of QC resources, and schedule compression.
Enterprise database underlying all imagery and data.	Complete lineage of all processing. Automated generation of FGDC-compliant metadata.

2.3.2.2 IT Infrastructure

The massive amount of geospatial data acquired and processed by Surdex on an annual basis requires a commensurate IT infrastructure to meet demanding schedules and ensure the integrity of the data. Surdex has invested numerous years in the development of a custom Enterprise database, and it is used for all Surdex projects, including LiDAR projects. This database is responsible for tracking the status of deliverables, data acquisition, image inspection, intermediate digital orthoimagery, quality control results, and so forth. It can generate reports required on this contract, such as daily acquisition progress reports.

The database tracks all orthoimages created from the numerous images, allowing it to trace the lineage of any pixel in the project back to its original image. It also retains image metrics for every intermediate and final product generated during production. For example, its relational constructs allow it to determine which Master Tiles, and thus deliverable tiles, can be generated at any time. As such, standard queries can be used to determine which areas can be converted into products. Since the database tracks the completion of Master Tiles and deliverable tiles, complete and detailed status is available at any time.

Software and Tools			
Phase	**Tool**	**Ancillary Tools**	**Surdex Enterprise Database**
Flight planning	Leica MissionPro	ESRI ArcMap Surdex Grouping Tool PhotoShop Global Mapper	Flight plans Flight data ABGPS/IMU results Image inspection results Aerotriangulation results Image metrics Seamlines Client inspection results
Flight control	Leica FlightPro		
ABGPS/IMU processing	Novatel Inertial Explorer		
Post-processing	Leica XPro		
Image inspection			
Aerotriangulation			
Orthorectification			
Image processing	Surdex Grouping Tool		
Mosaic			
Accuracy validation	AccuracyAnalyst		
Client inspection and acceptance	Surdex SurCheck		

Surdex's processing uses a heavily distributed processing environment. Coupled with our custom software, each workstation in the facility can be used for computation. For image processing, orthorectification/mosaicking, and aerotriangulation, over one hundred workstations are available for use.

Surdex Data Storage Architecture		
Tier	**Storage**	**Comments**
Violin Memory StorNext shared SAN	110 TB	Data currently in production. Flash memory better than 400,000 IOPS and 6,000 MB/sec throughput
Infortrend StorNext shared SAN	1 PB	Data currently in production. Drives in a RAID6 configuration.
Windows NTFS Direct Attached Storage (DAS)	1 PB	Raw images – also backed up on LTO6 tapes. The files are distributed across 72 servers and managed by the database
TOTALS	**2.1 PB**	**Does not include local workstation storage.**

Surdex uses a tiered approach to storing data, providing a means to have primary data (data in production) stored on the fastest storage with files migrating down through the tiers to successively slower access as the likelihood of frequent access goes down. This minimizes the need for expensive, high-speed storage and allows us to keep the data on-line longer. Since many processes are compute-bound, this reduces the need for expensive, high-speed disks. Ultimately, all data is backed up to LTO6 tape for long-term storage.

The security of source imagery and related data is based on a "data in two places" rule. As raw data is received from the crews in the field a LTO6 tape is created immediately and a second copy is stored on the production storage systems. After inspection and GPS processing a second copy is made to tape. All of the parameters used to process the images are archived three times a day onsite and weekly offsite. Disaster recovery is simplified by the use of a database that stores the majority of processing parameters. All final products are archived to LTO6 tape after delivery.

In the spring of 2016, Surdex installed a diesel-powered backup generator that can fully sustain all production operations in the event of the loss of power; the fuel can be replenished indefinitely. This ensures that adequate time is provided to restore power without interrupting normal operations, ensuring production schedules are maintained.

2.3.2.3 Image Processing

Surdex limits sensor-specific processing to the front-end of the production chain and all imagery is retained in 4-band and 12 bpp (bits/pixel) format ("4x12") until the final tiles are produced. This allows us to make localized adjustments to color, tone, contrast, etc. without compromising the overall quality of the deliverable product. The 4x12 format also supports re-mapping to 8 bits/pixel, and to color and/or color infrared (CIR). All image resampling is performed using bi-cubic or Lagrange interpolation kernels to eliminate aliasing and similar artifacts.

Orthoimagery is produced to a contiguous "Master Tile" layout that encompasses the entire deliverable area with adequate buffering. Master Tiles are nominally 8K x 8K (8,192 x 8,192) pixels in size, in 4x12 format, and in the dominant reference frame of the project. Once the Master Tiles are completed, they can be used to generate all delivery tile layouts, including re-projection and changing of linear units (i.e.: US Survey Foot, International Foot, Meter, etc.) and re-mapping to the desired bit depth and number of bands using an automated process.

Image information displayed by Surdex's Grouping Tool.

Luminosity Histogram (Red, Green, Blue combined)

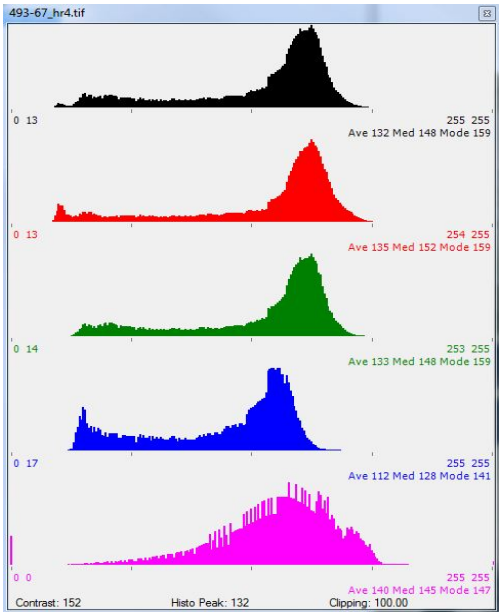
Red Band Histogram

Green Band Histogram

Blue Band Histogram

Near Infrared Band Histogram

Image Metrics →



Surdex's R&D staff has worked diligently over the last two decades to improve the accuracy, quality, and throughput of orthoimagery. This effort has resulted in a mix of third party, open source, and custom-developed algorithms and processes, operating within a customized, distributed processing environment. We utilize a common user interface, referred to as "Grouping Tool" (GT), and our entire production and project management staff is trained in its usage – simplifying cross-training to maximize the staff potential. An underlying Enterprise database tracks all source, interim, and final products. Image processing and orthorectification technicians all utilize calibrated display monitors to ensure consistent results.

Features and Benefits of Surdex's Orthoimagery Production Process	
Feature	**Benefit**
Image color, tone, balance, etc. prototyped before production begins in a Pilot Project.	Client participates in desired appearance of final product far in advance of delivery. The pilot project also checks form and format of deliverable imagery, metadata, etc.
All image processing and production performed in "4x12" space (4 bands, 12 bits/pixel) until the cutting of deliverable image tiles: (1) Generate color, 4-band, and/or color infrared (2) 8 or 12 bits per pixel deliverables	Preserving full content provides maximum latitude in mosaicking process. Ensures highest possible quality products.
Internal production tiles are in a contiguous (seamless) format, with deliverable tiles generated at the final stage. This supports: (1) Overlapping deliverable tiles (2) Multiple deliverable tile layouts (3) Multiple map projections (4) Multiple product resolutions	Accommodates clients with requirements for multiple layouts of deliverable products at marginal additional cost. Accommodates last-minute changes. Edits to data only done once to support multiple products.
Highly automated absolute radiometry and atmospheric processing, reduces: (1) Level of subjectivity by technicians (2) Production labor effort (3) Changes to be made in final stages of production	Higher volume and throughput.
Customized seamline generation process: (1) Highly effective (2) Inclusion/exclusion areas (such as building footprints)	Seamless final product. Reduced customer review.
Proven ability to incrementally produce large orthoimagery projects while preserving a seamless appearance at completion.	Allows incremental QC and delivery to address client priorities, leveling of QC resources, and schedule compression.
Enterprise database underlying all imagery and data.	Complete lineage of all processing. Automated generation of FGDC-compliant metadata.
Web-based QC tool available free-of-charge for clients: (1) Reduces cost and time associated with multiple deliveries of hard drives (2) Fast turnaround of fixes and validation of fixes (3) Progress tracking	Accelerates QC and acceptance process. Audit trail of all changes. Reduces time for customer QC.

Using Surdex's Grouping Tool, image processing technicians organize large blocks of orthoimagery into groups with common characteristics, which do not necessarily coincide with individual flight missions. The tool can display images in ground space, allowing operators to see the relative image quality between neighboring images and imagery can be viewed in either color or CIR to ensure 4-band continuity. The grouping of images is important because:

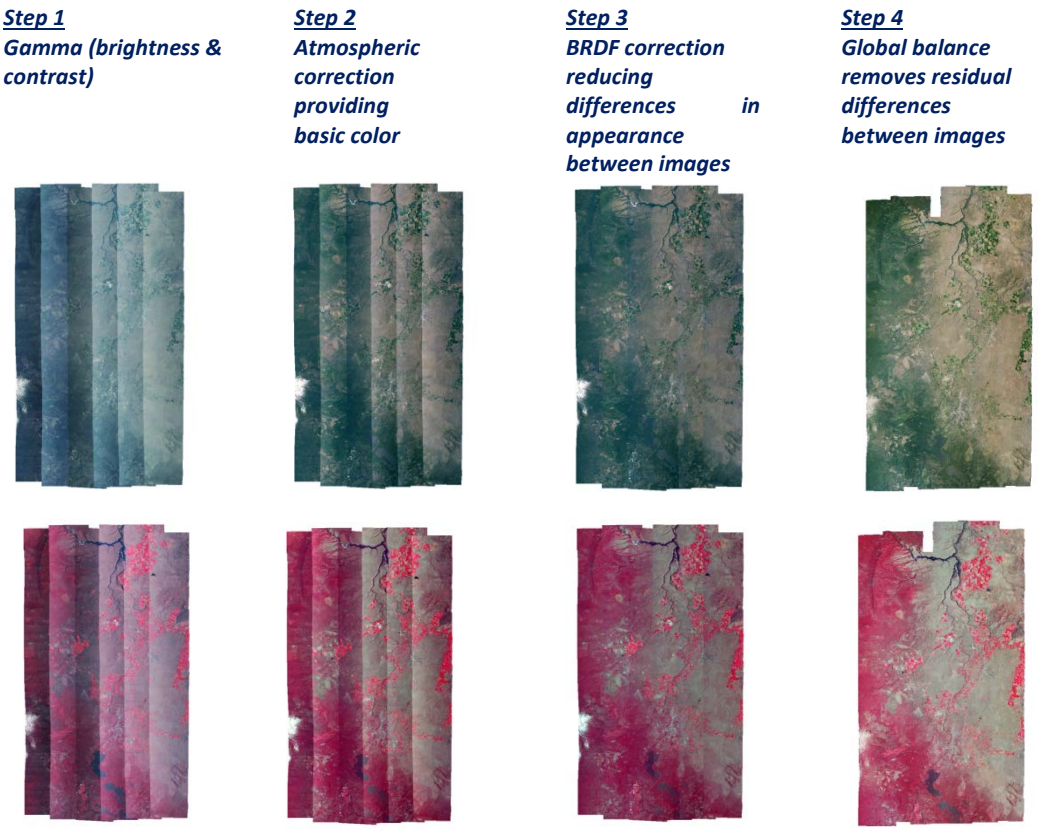
- The atmospheric conditions during capture may result in imagery covering regions of differing degradation caused by haze. This is particularly true in coastal areas.

- Sun movement during the day affects the direction of sun illumination. Understanding this allows efficient solar corrections of groups with common illumination effects.

There are distinct steps in the overall image processing:

- Grouping of image strip blocks and initial color corrections with a simple gamma correction (brightness and contrast)
- Atmospheric corrections based on radiometric calibration of the sensor
- Bidirectional Reflection Distribution Function (BRDF) corrections
- Final Global Balance during the mosaicking phase

Visual overview of image processing steps

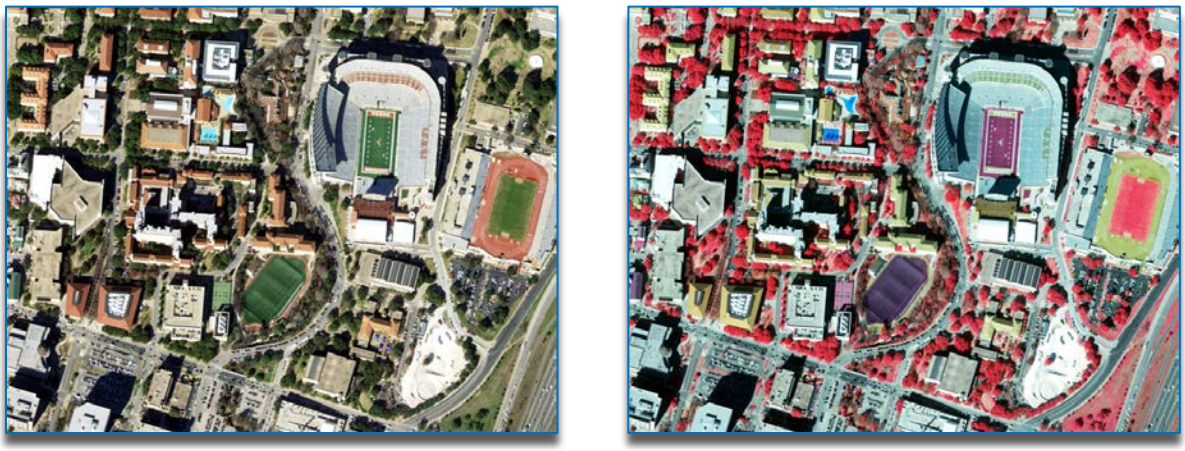


2.3.2.4 4-Band Processing

Surdex's image processing approach supports 4-band (R-G-B-NIR), color (R-G-B), and color infrared (CIR, NIR-R-G) products by retaining imagery in 4-band x 12 bpp form until generation of the final deliverables. Since the red and green bands are common to the color and CIR renditions within a 4-band file, care must be taken to ensure proper appearance of both. In general, this is accomplished by limiting changes to the NIR band as much as possible. The approach is to first lock down the color rendition (ordered R-G-B or bands 1-2-3) and then processing the NIR band to achieve the CIR rendition (ordered NIR-R-G or bands 4-1-2). From our extensive experience with 4-band products, we have found that client expectations for a CIR rendition vary, primarily due to prior experience with color infrared film.

Note that Surdex's web-based inspection tool (SurCheck[SM]) has the ability to render either a natural color or CIR view of 4-band products, providing comprehensive inspection capability.

Color (left) and CIR (right) renditions of 4-band imagery (University of Texas at Austin, 2015, 0.5-meter GSD).



2.3.2.5 Orthorectification

Orthorectification will be performed using the Leica XPro software. The orthorectification process employed by the XPro software includes a ray trace from a ground coordinate to the pixel. All resampling is performed using bi-cubic resampling to assure pixel location accuracy and avoids aliasing effects common to nearest-neighbor and even bilinear resampling techniques.

2.3.2.7 Elevated Structures

Elevated features, such as non-grade crossings of transportation lines and bridges, require a localized elevation model to ensure no layover and/or smearing is introduced into the final product. In contrast to most initial DTMs/DEMs which are "bare earth," these models actually become Digital Surface Models (DSMs). A DSM utilizes breaklines and is kept in a TIN (triangulated irregular network) format. TINs are not constrained to a grid of points that would affect the accuracy and quality of the final product. During orthoimage production, all overpasses, bridges, transportation lines, and even "urban canyons" are scrutinized to determine whether a localized DSM is required to maintain product quality. In essence, orthoimage technicians can use known locations of these types of features to "drive" to each and determine the amount of localized terrain modeling required.

Building lean in built-up areas (BUAs) can be minimized by increasing sidelap and using flight plans that align with the "urban canyons" present in dense metropolitan areas. The increased sidelap reduces the "neat area" to provide optimal near-nadir views of the features. Additionally, the increased sidelap is used by technicians for more potential sources of optimal views of leaning features.

An advantage of the ADS100 pushbroom technology offered by the ADS100 is that a very large number of features are imaged in a near-nadir fashion. This is because features are only displaced to the left and right of the center of the flight path and not in the in-flight (downtrack) direction. This is not true of frame-format digital sensors, where displacement is radial in all directions from the center of the image. With nadir views of many elevated features, there is little (and sometimes no) need to create a DSM.

2.3.2.8 Occlusion and Smearing

Surdex's orthorectification module has the ability to detect potential occlusions and smearing that may occur in rugged terrain. This software creates a graphical overlay that directs technicians to examine pixels that may be incorrect, alleviating them from the task of inspecting imagery for such issues. If an occluded or smeared area is encountered, the corresponding imagery from an overlapping orthoimage is inserted to replace it during the mosaicking process.

2.3.2.9 Specular Reflection

Specular reflections caused by glare from sun reflections off water bodies and/or large structures may be present in some orthoimagery. During the 100% image inspection, technicians note images containing specular reflections for use during mosaicking. In addition, the Enterprise Database computes the sun elevation angle and azimuth for all imagery. Surdex's standard approach is to minimize the spectral reflectance by seamline placement using a standard feathering, thereby ensuring that features along the land/water interface are not affected. However, this may result in a visible mosaic seamline within a body of water depending on the level of spectral reflectance and or tonal change between orthophotos.

The ADS100 potentially lends itself to better treatment of objectionable artifacts stemming from effects such as specular reflection, wind chop, and the like involving bodies of water.

Since the ADS100 has continuous acquisition of forward and aft imagery through arrays mounted approximately 25.6° (forward) and 17.7° (aft) relative to the nadir array, it can provide alternative views. Since the key issue with specular reflection and the like is the relative angle between viewing and the sun location, the two arrays provide alternatives to the nadir array. For example, if a mission is flown into the direction of the sun, it is logical to assume that the forward and nadir arrays may be adversely affected by resulting specular reflections. However, the aft array is often unaffected since because is looking in the opposite direction and the orthoimagery technician can use orthoimagery from this array, eliminating or minimizing the adverse effect.

During image inspection, the nadir array is evaluated for specular reflection and each affected image/strip annotated in our Enterprise database. This same database also tracks the sun angle and azimuth at the exact time of imaging, setting the stage for the prediction of specular reflection effects. If a nadir image is flagged for specular reflection, the ortho technician is alerted to the situation and will address it during production.

2.3.2.10 Elevation Model Errors

Elevation model errors can be detected in several ways, including visual review of relief-shaded representations of the area. In addition, Surdex's orthorectification software automatically compares all of the points used in aerotriangulation (pass, tie, check, and control points) with the elevation model. Each point's elevation as interpolated from the DEM is compared to its aerotriangulation value and the difference computed in the orthoimage pixel space. Although some aerotriangulation points may not be on the ground surface, this function generates a shape file of differences that often reveal (1) obvious errors in the elevation model or (2) changes in the ground surface due to construction after the elevation model was developed. Once elevation model issues are detected, they are resolved with stereoscopic editing and/or digital correlation.

2.3.2.11 Seamline Generation

There are three steps in the seamline process:

- Automatic generation of initial seamlines.
- Editing of seamlines from within Grouping Tool.
- Application of the seamlines to create the Master Tiles.

The automatic seamline generation is queued from within Grouping Tool for execution in Surdex's distributed processing environment. Our "cost-based" approach analyzes the cost of many paths to create the best seamline between all overlapping orthoimages. Multiple cost factors can be weighted by the technician to provide flexibility to tailor seamline placement strategy to the landform and land cover for a given project. A mix of percentage weights will result in the software calculating a cost for each path by summing the weighted contribution of each cost factor.

Technicians review the automated seamlines and correct any requiring revision. The technicians log the accepted seamlines in the database, resulting in each seamline polygon having a record the technician and date/time.

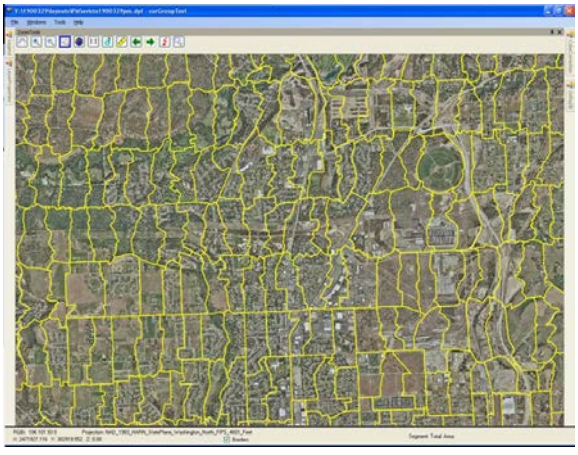
In the following example, manual editing resolves an automatically-generated seamline that sliced through buildings by modifying the seamline placement along a road where its presence is not visible in the final product.

Initial automatic (left) and manually corrected (right) seamlines.

Surdex will supply an ESRI shapefile that fully delineates the seamlines. Our custom software automatically generates the seamline data during production, made possible by our software integrating automatic seamline generation and interactive edit into a single application and interface. Each orthoimage merged into the mosaic is defined by a polygon representing its bounds with each of its overlapping neighbors. The polygon attribution contained in the shapefile includes:

- Date of acquisition.
- Polygon start/end date/time.
- Spectral resolution (color, CIR, 4-band).
- Sensor manufacturer and model (e.g.: Leica ADS100).
- Sensor serial number.
- Aircraft type and tail number (e.g.: C441, N2NQ).
- Average flying height.

Example of Final seamlines.



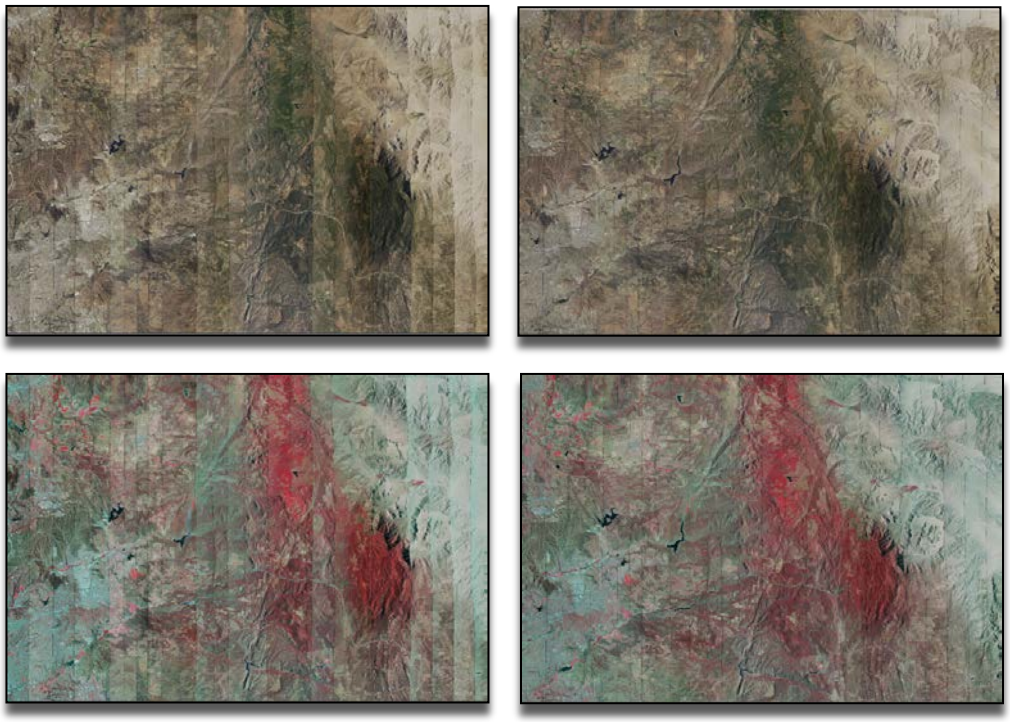
2.3.2.12 Global and Block Balance

Surdex's custom-developed Global and Block Balance software eliminates any residual issues evident after application of BRDF and atmospheric corrections. This is handled by two functions:

- *Block Balance* fits correction models to each strip of images with a single simultaneous bundle adjustment.
- *Global Balance* is then run to correct local differences in illumination between strips, and the results can be previewed in Grouping Tool without the need to generate intermediate files.

Global Balance uses a "rigid body model" correction calculated for each orthoimage that best forms a normalized block fitting neighboring orthoimages. Higher-order polynomial versions of the rigid body result in a "flexible body" correction that transitions differences in the overlapping regions. As this is a model-based approach, it is possible to limit the influence of scene specific differences in overlapping orthos. For example, if crops are mature and green in one flight line and only tilled soil in the overlapping neighbor, the model will disregard these measurements as outliers and not force the green crops to match the brown soil.

Before (left column) and after (right column) global balancing for color (top row) and CIR (bottom row). (Seamlines not applied)



2.3.2.13 Tile Writing

During this step, all balance adjustments and seamlines are applied to the individual orthoimages to create the Master Tiles. Once complete, the deliverable tiles can be generated and our custom software can create virtually any tile layout using automated batch processing. This includes support for:

- Overlapping and contiguous tile layouts.
- Multiple tile layouts.
- Creating tiles in other map projections and/or linear units (e.g.: meter vs. US Survey Foot).
- Downsampling the resolution, for example creating a 1' resolution tile set from a 6" tile set.
- Since the Master Tiles are in 4x12 format, tiles can be delivered as such or remapped to 8 bits/pixel, and in 4-band, color, or color infrared (CIR) format.

- Supported output file formats include MrSID, GeoTIFF, JPEG, JPEG200, ECW, TIFF/TFW, etc.

The Master Tile concept makes error correction during inspection very simple and comprehensive. Once an error is corrected in the Master Tiles, all applicable client tile layouts are automatically regenerated, potentially resolving numerous deliverable tiles.

2.3.2.14 Surdex's Web-Based Inspection Tool (SurCheck[SM])

To assist our clients with the inspection of their orthoimagery, Surdex provides – *at no additional cost* – our web-based image inspection tool, SurCheck[SM]. This tool is the result of over five years of continuous improvement and has been met with outstanding reviews and benefited from user requests for enhancement. It is implemented in HTML5, JavaScript, php, and the ArcGIS API for JavaScript, providing flexibility for enhancements in the future.

SurCheck streamlines the inspection, remedial action, and delivery timelines. As call-outs are reported by reviewers, Surdex resolves each and notifies reviewers so they may confirm the correction. Since Surdex works off call-outs in parallel with the inspection process, it is common for reviewers to receive corrections within 1-2 weeks. When all call-outs are resolved for the project the data can be shipped on hard drives for final delivery. In many cases, clients choose to have orthoimagery added to SurCheck incrementally, further expediting inspection and allowing leveling of inspection resources.

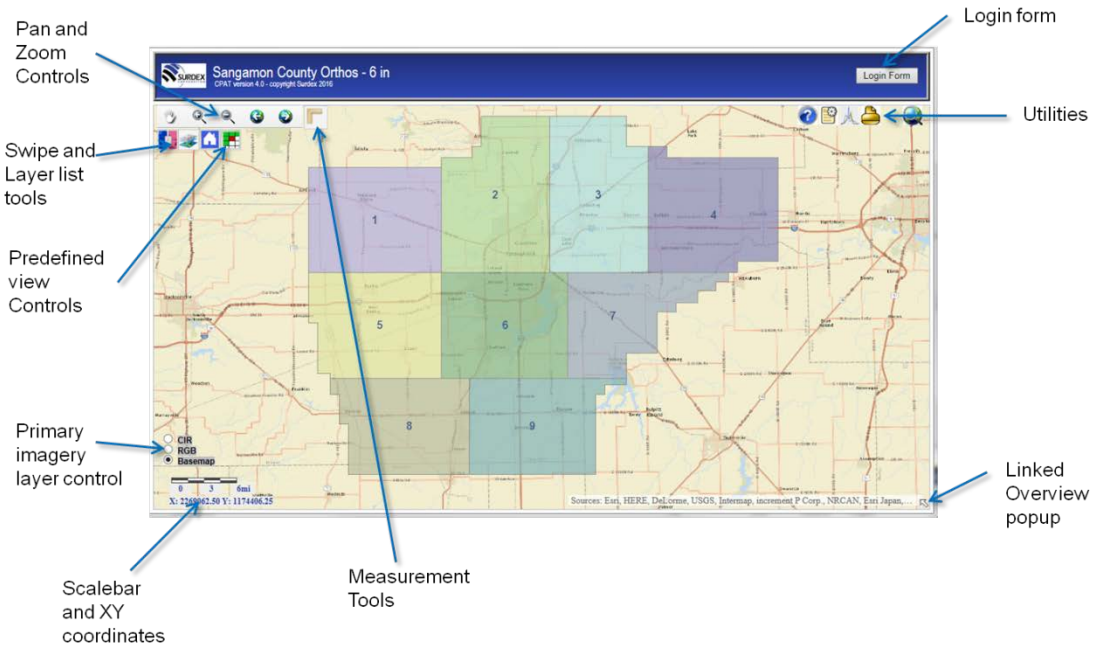
SurCheck[TM]	
Feature	**Benefit**
Administrative	
Username and password login access.	Protected access for client and reviewers.
Client manager can assign reviewers to separate work zones within a project.	Multiple reviewers for each project to increase inspection rate and support multiple partners. Clients can assign multiple reviewers to specific work zones. Managers can view call-outs from reviewers to ensure a consistent approach.
Four (4) tiers of edit calls: Standard inspector Client manager Surdex reviewer Final client reviewer	Management of call-out resolution with appropriate levels of responsibility and authority within the client and within Surdex. Covers entire life cycle of inspection and resolution process, ensuring end product is fully inspected and accepted. Client manager can override client reviewers. Surdex reviewer dealing with disposition of a call-out (natural feature, out of scope, etc.).
Help menu for most options.	On-line assistance with operation reduces need for a manual or access to training guide, allowing session to continue uninterrupted.
General Interface	
Operates in Internet Explorer, Firefox, Chrome, Edge, and Safari. Works on smart tablets within individual interface limitations.	No browser plug-in required (prior versions required Silverlight). More flexibility for future enhancements requested by users or implemented by Surdex.
Single-page interface with no pop-up windows. Full-screen primary map window. Logical groupings of toolbars.	Simpler and cleaner interface. Maximizes screen real estate for viewing of larger areas. On-demand overview window.
Project start-up view showing basemap and work zones	Overview of assigned areas to ensure familiarization.
Surdex-provided overlay of seamlines	Assists in searches for potential artifacts. Issues along seams or poor placement of seamlines are the most common problem found during inspection.
Ability for users to add their own map services.	Examples include historical imagery, vector overlays, control point overlays, parcels, ArcGIS Online layers, etc.
Swipe function with user-selectable layer.	Combined with user-added image services, provides a quick compare to historical imagery. Can swipe color and CIR renditions of 4-band products to review consistency and quality.

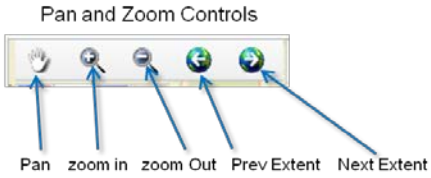
Feature	Benefit
User-selectable layer list. Toggle layer visibility. Adjust layer opacity.	Customize view to suit reviewer preference.
Double-click magnifier window with adjustable zoom. Click and drag of magnifier box to other positions within window. Adjustable zoom level up to 9X, limited to 1:1 project resolution.	Quick toggling between magnifier and standard view allows reviewers to retain scale with close-up inspection of potential artifacts.
Generate graphical and quantitative histogram of current window, including: Red, green, blue, NIR, and luminosity (red+green+blue). Reporting of basic image metrics measures (contrast, clipping, brightness, etc.).	Aids in determining adherence to project-specific image metrics.
Defined tile scheme within each project that fits screen.	Simplifies inspection by focusing on full tile.
Progressive inspection of each tile in “snail trail” sequence. Simple acceptance of tiles any key press or mouse click. Accepted tiles are high-lighted.	Methodical approach streamlines inspection and portrays status.
“Acceptor” function provides completely random sampling of tiles to a percentage desired by the client.	Supports less than full inspection or a management review of work to date.
User-selectable rectangle, polygon, circle.	Enhanced tools to simplify delineation of artifacts.
Select from list of typical call-out types.	
Comments can be added by users for repeated use between sessions.	Essentially adds a project-specific call-out type.
Table view of call-outs, status, and action.	Tabular review of status.
Ability to walk through list of call-outs, re-centering view to each one.	Review of existing call-outs for status and consistency.
Save call-outs to a shape file or CSV files.	Export call-outs to non-SurCheck users for review. View within other applications (ESRI ArcMap, AutoCAD, etc.) CSV easily imported into Excel.
Measurement tool (points, distance, and area). User-selectable units (i.e.: feet, meters, miles, kilometers, etc.)	Supports investigation of call-outs against specifications (such as seamline shear, size of artifact, etc.).
Print current screen to printer or PDF.	Simplifies creation of samples, bug reporting, etc.

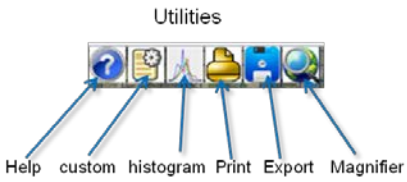
Upon request, Surdex can provide a video and PowerPoint presentation to familiarize and train users on the tool’s use, as well as access to a sample project.

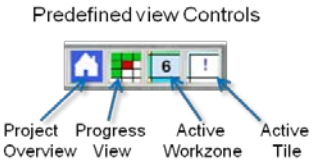
The following pages portray selected aspects of SurCheck.

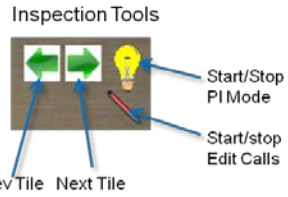
SurCheck layout and tools.

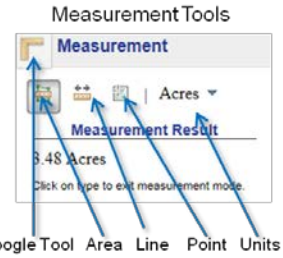


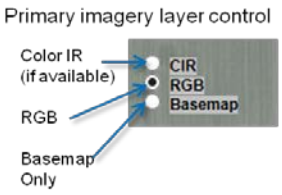




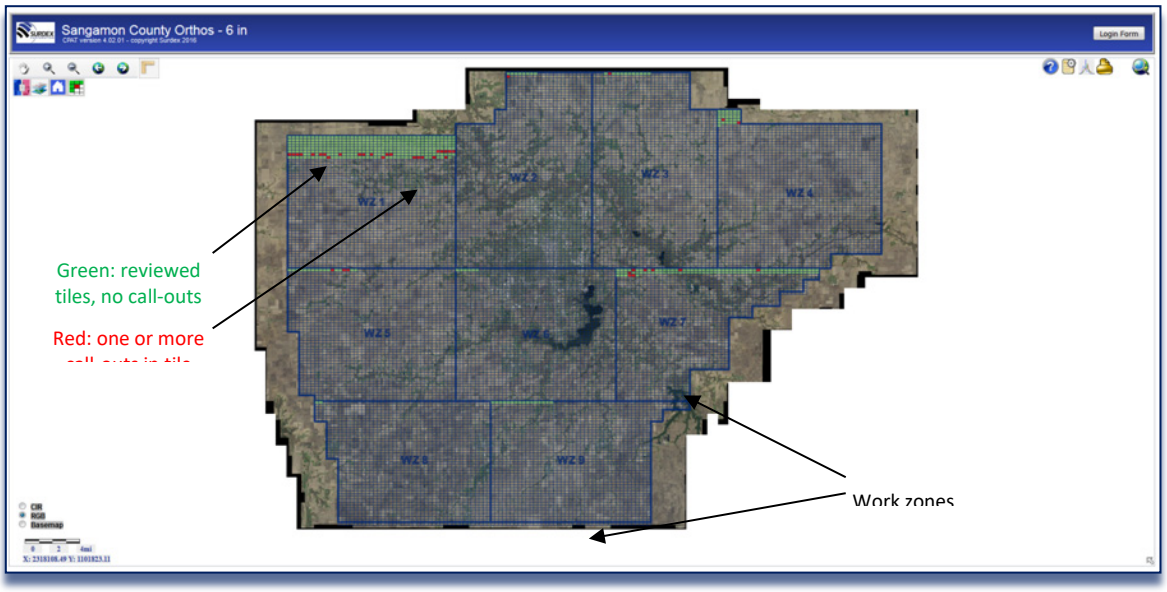




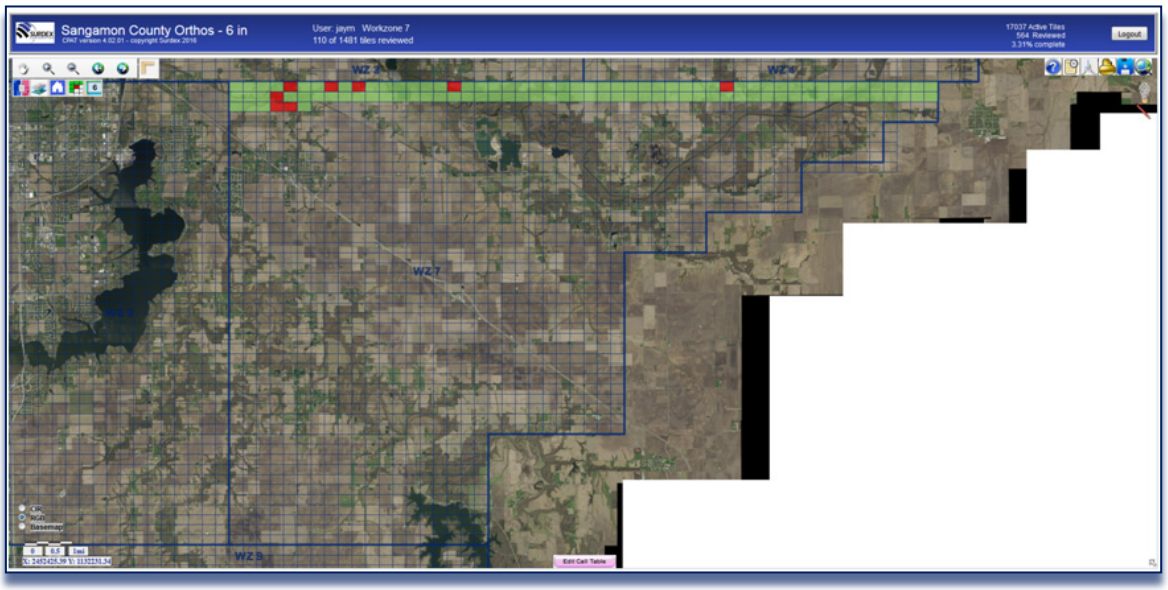




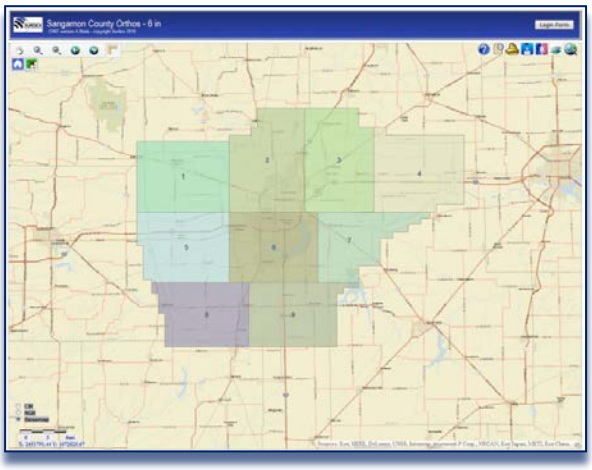
Manager View Showing Progress in all Work Zones.



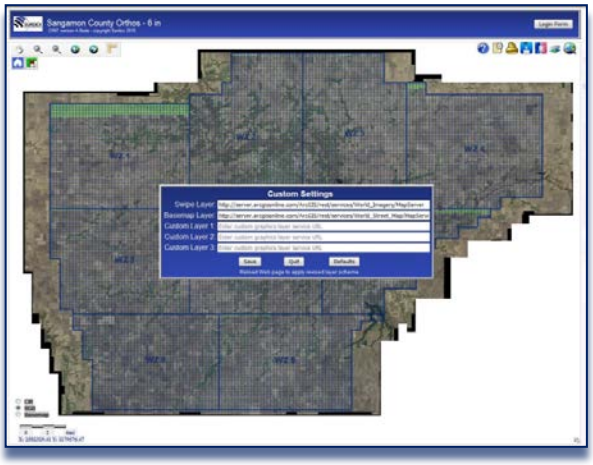
Work Zone Progress.



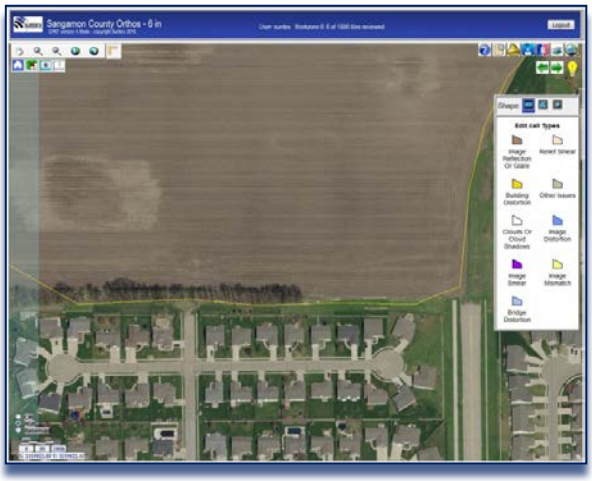
Initial Screen Showing AOIs.



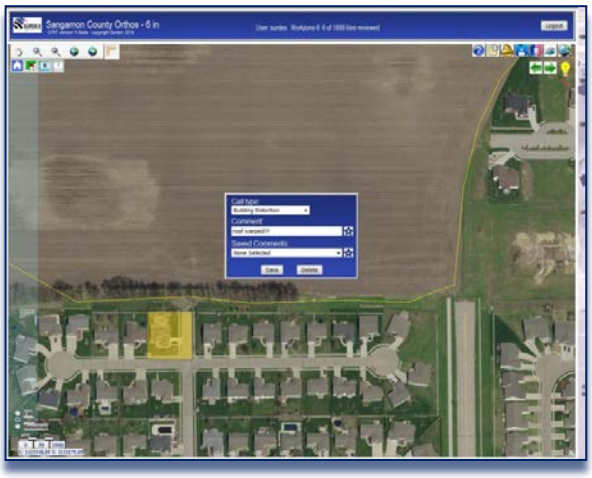
Custom Settings Form.



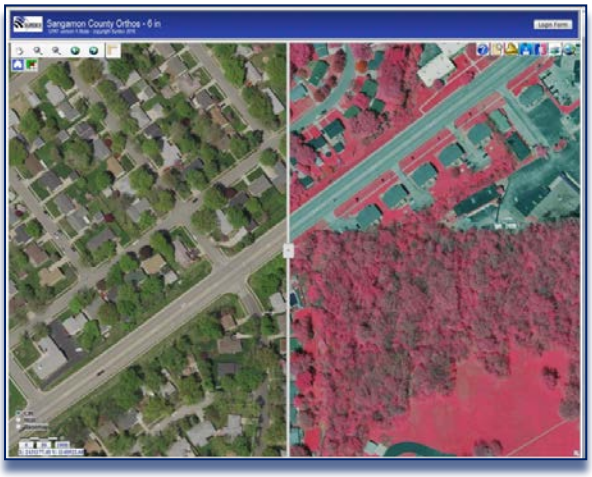
Edit Calls Template.



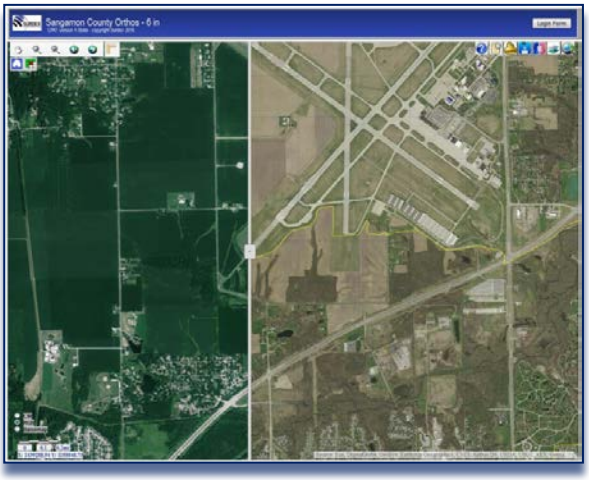
Edit Comments.



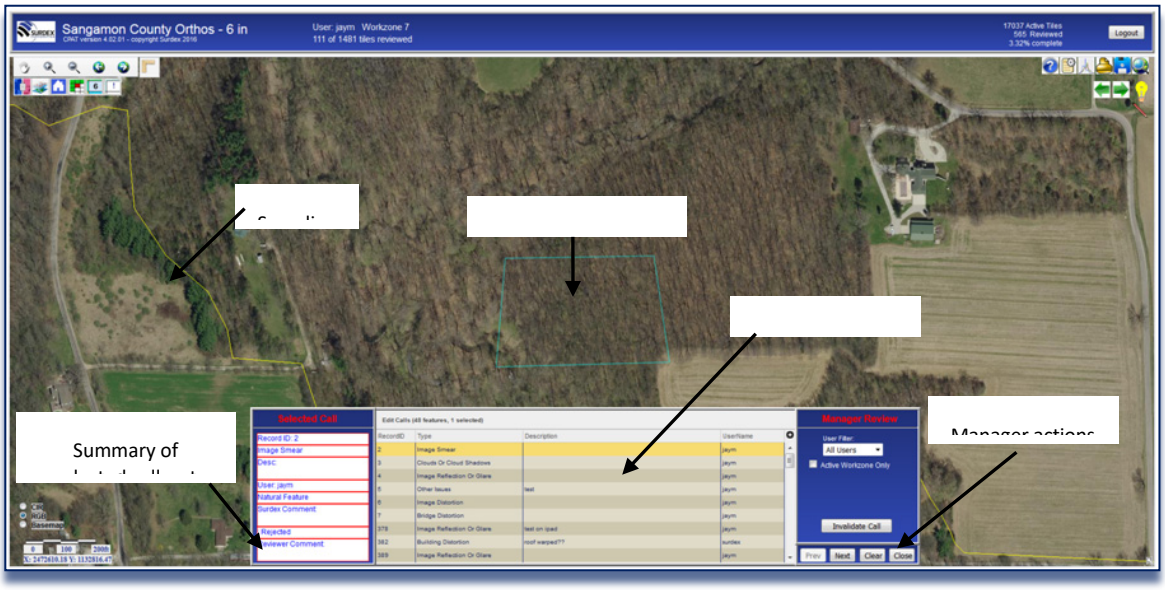
Swipe Between Color and CIR.



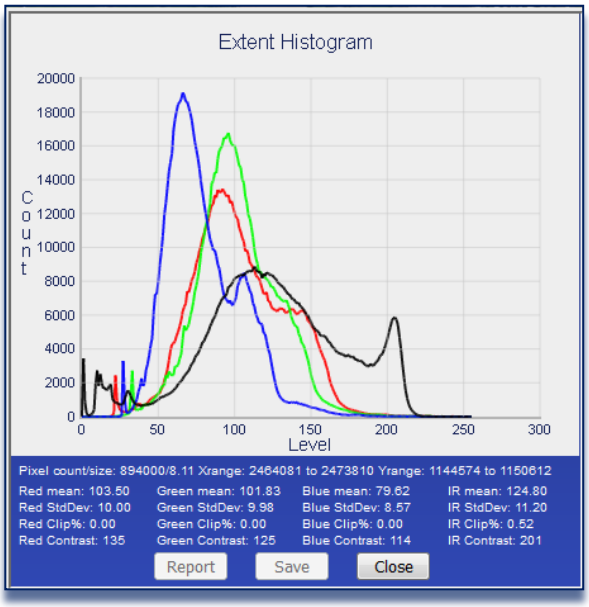
Swipe Between Color and ArcGIS.com Imagery.



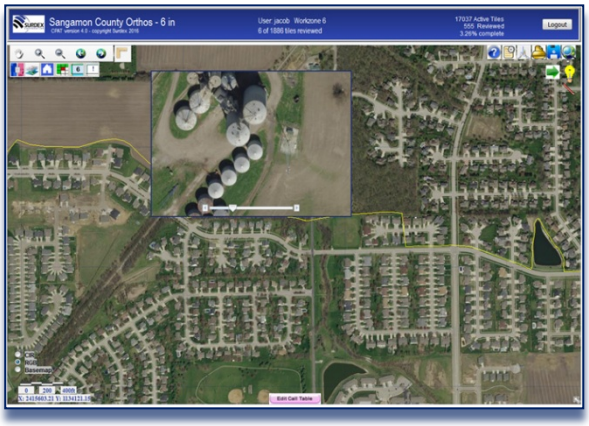
Manager call-out review, checking each in turn.



Histogram of View Extent.



Magnifier Tool.



2.4 METADATA

The delivery of FGDC-compliant metadata has become a standard procedure over the last decade. As such, Surdex has developed largely automated procedures for generating metadata files. Surdex will work with the Consortium to define the detailed contents of the metadata files.7.5 Summary of Deliverables.

2.5 SUMMARY OF DELIVERABLES

Our understanding of the deliverables is summarized in the following table.

Summary of Project Deliverables (RFP Attachment G)			
Deliverable	**Reference**	**Due Date**	**Format**
Flight and control layout for 12" extent	Contract Exhibit B-1	Contract completion	PDF
Flight and control layout for 6" extent	Contract Exhibit B-2	Contract completion	PDF
County orthophoto tile index map	RFP 7.6.5	Contract completion	Shapefile
Ground control report	RFP 7.2.4	April 30, 2018	PDF
ABGPS/IMU report	RFP 7.2.3	After acquisition	PDF
Signed flight logs	RFP 7.2.2	After acquisition	PDF
Sample raw imagery	RFP 7.2.2	Within 10 days of completion of acquisition	GeoTIFF
Aerotriangulation reports	RFP 7.2.3	After acquisition	PDF
DEM	RFP 7.3.1	By December 15, 2018	GeoTiff
Orthoimagery seamlines	RFP 7.6.3	By December 15, 2018	Shapefile
Pilot project orthoimagery	RFP 7.3.2.4	By June 15, 2018	GeoTIFF
Sensor calibration reports	RFP 4.3	With proposal	PDF
Orthoimagery tiles	RFP 7.3.2 RFP 7.6	By December 15, 2018	GeoTIFF
Metadata	RFP 7.4	By December 15, 2018	FGDC
MrSID files	RFP 7.6	By December 15, 2018	MrSID
Certificate of insurance	Contract Section III	Contract completion	PDF
Certificate of errors and omissions insurance	Contract Section III	Contract completion	PDF
Written monthly status reports	Contract IV.B.3	Monthly	PDF
Monthly invoices	Contract IV.B	Monthly	PDF

Section 3: Project Team

3.1 STAFF QUALIFICATIONS

Surdex puts a strong emphasis on effective project management; however, unlike numerous firms requiring project managers to fulfill other management, sales or production duties, we employ personnel with the **sole responsibility** of managing our projects.

Mr. Cornell Rowan, who was the project manager for all 4 of projects handled by Surdex for the Consortium has been assigned as the project manager for the 2018 Digital Orthophotography project. Cornell is a Certified Photogrammetrist with extensive experience managing similar projects.

Surdex project managers are managed by Mr. Wade Williams, who has nearly two decades of experience at Surdex and in the industry. Mr. Bohn works closely with all project managers reporting to him. He is both a Certified Photogrammetrist and certified by the Project Management Institute.

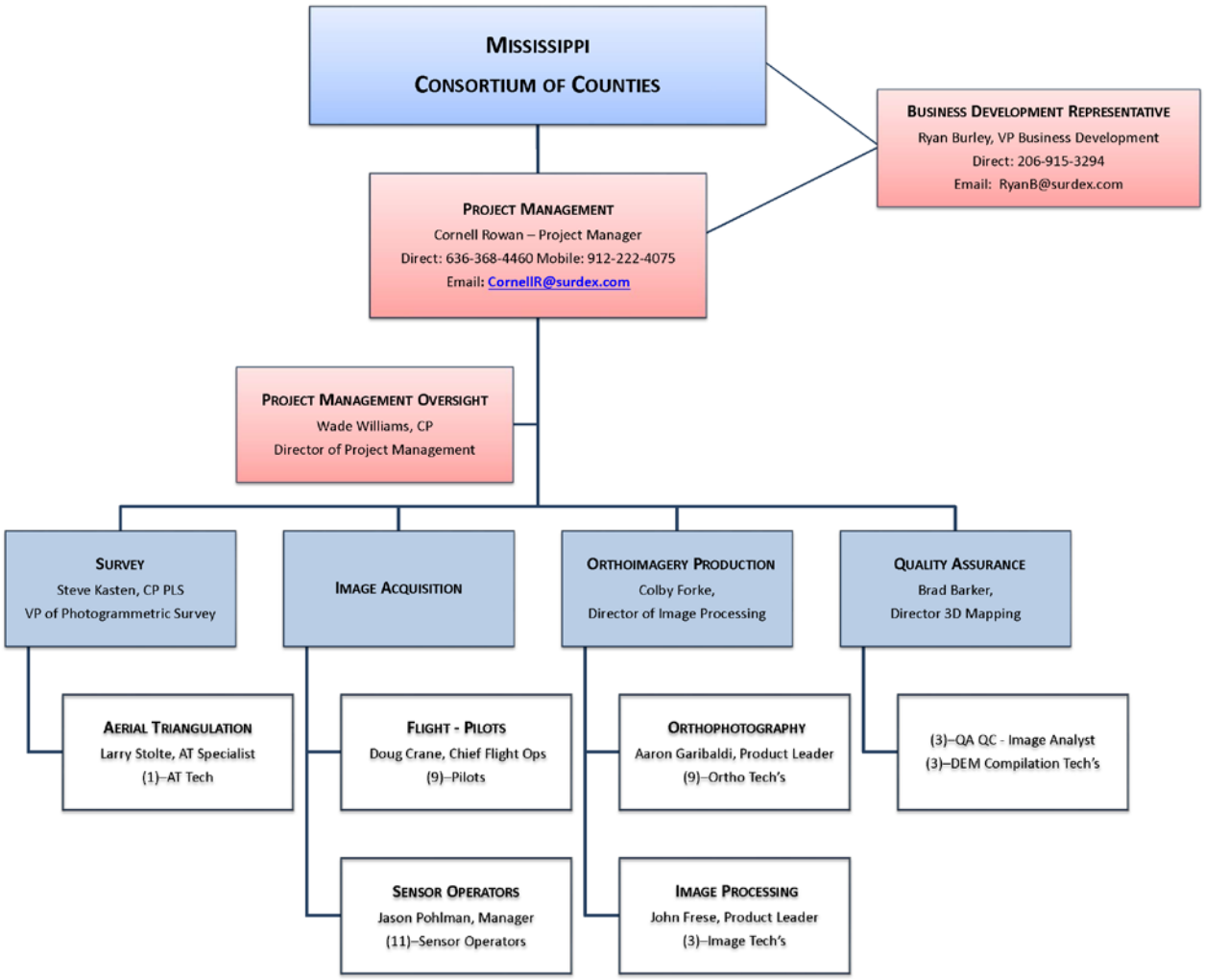
3.1.1 Certified Photogrammetrist

Surdex has 10 active Photogrammetrists certified with the American Society of Photogrammetry and Remote Sensing. The following is a synopsis of these individuals and their certification numbers as well as the team members who are licensed Professional Land Surveyors.

ASPRS Certified Photogrammetrists					
Name	Years Exp.	Certification/ Registration	Name	Years Exp.	Certification/ Registration
Dave Beattie	20	2009, #1417	Jim Gottgetreu	36	2017, #1623
John Boeding, PLS	29	1997, #1043	Scott Merritt	20	2010, #1444
Tim Bohn	20	2002, #1207	Cornell Rowan	33	1997, #1055
Steve Kasten, PLS	29	1997, #1040	Wade Williams	22	2006, #1290
Colby Forke	17	2016, #1598			

3.1.2 Team Organizational Structure

The following figure portrays our organizational structure for this project.



3.1.3 Key Staff Resumes

3.1.3.1 Project Management

CORNELL ROWAN, CP — **PROJECT MANAGER**

Project Manager

Experience	Project Duties
■ Professional: 33 years ■ Company: 9 years	Cornell oversees assigned projects and manages the scopes of work for various clients. He is responsible for managing in-house communications regarding all aspects of project execution including client communication, project planning, surveying, aerial photography acquisition, scanning, aerial triangulation, LiDAR processing, planimetric/ topographic feature collection and digital orthoimagery production.
Education / Certification	
■ BS, Engineering Technology, Jackson State University, Mississippi ■ ASPRS Certified Photogrammetrist, #1055 (1997)	
Software Proficiencies	ESRI software (ArcInfo, ArcGIS and ArcView), Intergraph's MicroStation, AutoCAD, Autometric's SoftPlotter, PhotoShop and Microsoft Office

WADE WILLIAMS, CP — **PROJECT OVERSIGHT**

Director of Project Management

Experience	Project Duties
■ Professional: 22 years ■ Company: 22 years	With 15 years of project management experience at Surdex, Wade is one of our most experienced project managers. As the Director, he oversees the project management staff, ensuring all projects remain on schedule and all deliverables meet specifications. He provides the team leadership skills to make timely decision based on his complete understanding of project planning for the successful project delivery. Wade oversees assigned projects and manages the scopes of work for various clients. He is responsible for managing in-house communications regarding all aspects of project execution including client communication, project planning, surveying, aerial photography acquisition, scanning, aerial triangulation, LiDAR processing, planimetric/ topographic feature collection and digital orthoimagery production.
Education / Certification	
■ BS, Cartography and Mapping Technology, Missouri State University ■ ASPRS Certified Photogrammetrist #1290 (2006)	
Software Proficiencies	ArcInfo, ESRI, ArcGIS, Adobe Photoshop, Lizard Tech Geo Express, Global Mapper, Accuracy Analyst, Microstation, Softplotter, FileZilla FTP, Photoshop, Surdex GroupTool

3.1.3.2 Key Production Staff

STEVE KASTEN, CP, RLS
Senior VP, Survey

SURVEY & CONTROL MANAGER

Experience

- Professional: 23 years
- Company: 18 years

Education

- BS, Earth Science/Cartography, Southern Univ. Edwardsville, IL
- MS, Civil Engineering & Photogrammetry, Purdue University

Certifications

- ASPRS Certified Photogrammetrist, #1038 (1997)
- North Carolina Professional Land Surveyor, #L-4106
- Oregon Professional Photogrammetrist, #80665RPP
- South Carolina Professional Photogrammetric Land Surveyor, #24303
- Virginia Surveyor Photogrammetrist, #000119
- Florida Professional Surveyor and Mapper License # LS6683

Project Duties

Steve has over 25 years of experience in the fields of photogrammetric engineering application development, photogrammetric mapping, geodesy, cartography and surveying. While at Surdex, Steve has performed disparate duties that include the management of photogrammetric projects, airborne GPS survey data and triangulation. In addition to his extensive project management experience, Steve has experience providing direct photogrammetric engineering support services. He is skilled in developing algorithms for sensor modeling, post processing of GPS data, error propagation, photogrammetric data reduction, and implementing algorithms into engineering programs.

Software Proficiencies

AutoCAD, MicroStation, Global Mapper, Trimble Business Center, Trimble Geomatics Office, Waypoint GrafNav/GrafNet, Corpscon, ISAT, Bingo, XPro, ESRI ArcGIS, IMAGINE, Agisoft Photo, Scan, Pix4D, ISite, Realworks

LARRY STOLTE
Aerial Triangulation Specialist

AERIAL TRIANGULATION

Experience

- Professional: 32 years
- Company: 32 years

Education / Certification

- U.S. Army Electronic School

Project Duties

Larry has over 20 years of direct experience performing Fully Analytical Aerial Triangulation (FAAT) and photogrammetric services. Larry has a unique blend of experience that allows him to accurately and adequately evaluate and process each FAAT challenge.

As a Fully Analytical Aerial Triangulation Specialist, Larry retains complete knowledge of the interrelationships between flight parameters, survey layout and field crew coordination, as well as a thorough knowledge of the challenges associated with each specialty. Larry personally evaluates each FAAT solution, producing the final reports for QC verification and approval. His unique experience in stereocompilation, surveying, and imagery inspection supplement his ability to precisely determine the cause of FAAT anomalies and eliminate them from future occurrences where possible.

Software Proficiencies

Waypoint – GrafNet, Waypoint – GrafNav, Waypoint – Inertial Explorer, Image Station Automatic Triangulation, Leica XPRO, Surdex Group Tool

DOUG CRANE
Chief of Flight Operations

IMAGE ACQUISTION – PILOT

Experience
- Professional: 20 years
- Company: 1 years

Education
- BS, Aeronautical Engineering from Purdue University
- MS, Aeronautical Engineering from the Air Force Institute of Technology
- Graduate of the US Naval Test Pilot School

Project Duties
Doug is responsible for the personnel (pilot's) that operate our aircraft for aerial acquisition projects. As Chief Pilot, Doug is responsible managing pilot's schedules and availability and knowledge of flight specifications for each mission. He is engaged in the pre-flight planning preparations that include monitoring the weather conditions, review of aerial flight plans for LiDAR and photography capture, adherence to overall project specifications, proper equipment and material handling procedures, pre- and post-flight status reporting, and all FAA notices and air space designations along with any NOTAMs (notices to airmen).

JASON POHLMAN
Flight Acquisition Manger

IMAGE ACQUISTION - SENSORS

Experience
- Professional: 9 years
- Company: 9 years

Education / Certification
- Applicable Technical Training: Aerial Survey Sensor Operation Certificate

Project Duties
As Flight Acquisition Manager, Jason is responsible for preparation and/or review of aerial flight plans for the capture of imagery or LiDAR data, adherence to overall project specifications, weather condition monitoring, proper equipment and material handling procedures, pre and post flight status reporting.

Jason manages the operation of the sensors, which includes the installation of these sensors into the aircraft and maintaining any maintenance and repair schedules. He oversees the personnel for training on the sensor hardware and software. He maintains a clear understanding of flight capture conditions, internal/external priorities and aerial sensor limitations, installations, calibrations as well as GPS/IMU data collections.

COLBY FORKE
Director of Image Processing

ORTHOIMAGERY PRODUCTION

Experience
- Professional: 17 years
- Company: 15 years

Education
- BS Geography, University of Nebraska

Professional Memberships
- ASPRS Certified Photogrammetrist #1598 (2016)
- Adoption of ISO 9001 Quality Assurance Standards

Project Duties
Colby supervises and coordinates all phases of production that includes image processing, ortho-mosaic, and imagery quality control management. Colby works with the imagery and orthoimagery managers daily to coordinate production tasks, set priorities and assist with resource management. Colby directly reports to John Boeding, the Sr. VP of Operations, on resource allocations and progress of each project. He works closely with each project manager to assure our clients' needs are met for every project.

Software Proficiencies
ArcMap, Applanix PosPac, Adobe Photoshop, Orthovista, GeoExpress, MrSID, Socet Set, Softplotter, Microstation, Global Mapper, Leica XPro, Surdex Production Tools (GroupTool)

JOHN FRESE
Image Product Leader

IMAGE PROCESSING

Experience
- Professional: 24 years
- Company: 14 years

Education / Certification
- Bachelor of Arts, Northwestern University, Illinois

Project Duties

John is responsible for the image processing and inspection of all digital imagery. John has been overseeing the production of digital imagery for some of the company's largest and most challenging projects.

Software Proficiencies

Surdex SurGroup Tool software suite, Leica XPro, Leica FramePro, Intergraph ZIPPS, Symantec BackupExec, Adobe Photoshop, GlobalMapper, Enfuzion (distributed processing)

AARON GARIBALDI
Orthophotography Product Lead

ORTHOIMAGERY PRODUCT

Experience
- Professional: 14 years
- Company: 10 years

Education / Certification
- Some College Studies

Project Duties

Aaron has involved in the production of high-end digital orthoimagery. These activities include orthorectification, radiometric balancing, cutline placement, Quality Control and final preparation and packaging of digital orthoimage data products.

Software Proficiencies

ArcMap, Applanix PosPac, Adobe Photoshop, Orthovista, GeoExpress, MrSID, Socet Set, Softplotter, Microstation, Global Mapper, Leica XPro, Surdex Production Tools (GroupTool)

BRAD BARKER
Director of 3D Mapping / QA/QC

QUALITY ASSURANCE

Experience
- Professional: 21 years
- Company: 18 years

Education / Certification
- BS, Cartography and Map Technology, Southwest Missouri State University

Project Duties

Brad's primary responsibilities include cartographic finishing and design of geographic information system database conversion applications to support CAD/GIS database generation. Brad is also responsible for digital orthophoto and CAD production including data input, editing and plotting. Brad has expertise in CAD/GIS programs including the full ESRI suite of software products.

Software Proficiencies

ESRI ArcGIS, ArcIMS, AutoCad, Microstation, TerraSolid, Datem, LP360, Global Mapper, FME

3.1.3.3 Aircraft Crew Members

Our pilots have been with Surdex for over five years all of their experience has been in flying precise photogrammetric mission for aerial surveys.

Pilot – Air crew Members				
Name	**Yrs. Exp.**	**With Surdex**	**Certification**	**License**
Ron Hoffmann	40	40	FAA Certified	Commercial Pilot No. 492646081
Paul Briggs	29	3	FAA Certified	Airline Transport Pilot No. 3055926
George Duke	31	9	FAA Certified	Airline Transport Pilot No. 2857215
David Traube	5	3	FAA Certified	Commercial Pilot No. 3633040
Ryan Newman	5	2	FAA Certified	Commercial Pilot No. 3734479
Adam Bos	5	2	FAA Certified	Commercial Pilot No. 3720472
Phil Moughamian	4	1	FAA Certified	Commercial Pilot No. 3776176

Associated with each of our pilots are our aerial photographers who are responsible for the preparation and/or review of aerial flight plans for photography capture, adherence to overall project specifications, proper equipment and material handling procedures, pre and post flight status reporting. Our sensor operators are responsible for a clear understanding of flight capture conditions, internal/external priorities and aerial sensor limitations, installations, calibrations as well as GPS/IMU data collections.

Sensor Operators			
Name	**Yrs. Exp.**	**With Surdex**	**Training/Education**
Jason Pohlman	7	7	Aerial Survey Sensor Operation Certificate
Matt Stolte	9	9	Aerial Survey Sensor Operation Certificate
Joshua Miller	2	2	BA, Film Production, Webster University, Missouri
David Schubert	6	2	Studies in Graphic Design, Lewis and Clark Community College
Jack Rodriguez	2	1	Studied Geography, Southern Illinois University – Edwardsville
Dan Kohnle	3	1	BS, Geography and Environmental Resources, University of Southern Illinois – Carbondale
Derroll Brooks	1	1	Flight school at Aviator College of Aeronautical Science and Technology in Florida
Justin Hill	3	2	AS, Geography and GIS courses, St. Charles Community College
Garrett Hall	4	1	AS, Aerospace Sciences, Butler Community, KS
Quentin Baker	2	2	BA, Geography, S. Illinois University-Edwardsville

Our aircraft and equipment resources are supported by an in-house FAA-certified inspection, maintenance, and repair staff that maximizes the availability of these critical resources. We have on staff a Director of Aircraft Maintenance, Mr. Kevin Manahan. He has more than 30 years of technical experience in the field of aircraft maintenance. As director of aircraft maintenance, Kevin is responsible for providing the highest level of safety, and he maximizes aircraft availability for all of Surdex's aircraft. Kevin directs a team of nine mechanics, technicians and inspectors to ensure the accurate reporting on aircraft, personnel availability, ground support equipment and inventory control for Surdex's aircraft. This attention to people, equipment, processes and technology ensures the highest level of safety.

Section 4: Related Experience

4.1 Relevant Projects

Surdex is providing five relevant projects that demonstrate our capabilities to perform on project similar and size and scope to the 2018 project. Each of these used the proposed sensor for the effort, the Leica ADS100.

Reference #1

Client / Project	Contact	Surdex Project Manager
Southwest Florida Water Management District **(SWFWMD)**	Al Karlin Al.Karlin@swfwmd.state.fl.us (352) 796-7211 2379 Broad Street Brooksville, FL 34604	Jim Gottgetreu **Contract Amount** $790,000

Project Narrative

This project included numerous participants with varied requirements and needs; communication among participants and coordination were key to the successful completion of the project. Imagery was collected with a Leica ADS100 aerial digital sensor, processed and delivered as 6" GSD, 4-band, 32-bit digital orthoimagery in a 5000' by 5000' tiled uncompressed GeoTiff format for the entire district.

- The Southwest Florida Water Management District's core project area was ten counties comprising approximately 9,400 sq. mi.: Levy, Marion, Citrus, Sumter, Hernando, Pasco, Hillsborough, Pinellas, Manatee and Highland.
- The Florida Department of Revenue contracted for two additional counties (DeSoto County , 655 sq. mi. and Hardee County, 627 sq. mi.), which required a separate deliverable using the Department's naming convention.
- Two additional counties outside the project boundaries that were separate add-ons that joined the project (Polk County, 438 sq. mi. and Charlotte County, 226 sq. mi.).

The client designated certain areas as priority, which established the acquisition sequence; Surdex made incremental deliveries as these priorities were completed.

Year	Sensor	GSD	≈ Sq. Mi.	Acquisition Conditions	Notes
2016/2017	ADS100	6"	~11,500	Cloud free, leaf off	

Project Deliverables	• Uncompressed 6", GSD 4-band, 32-bit GeoTIFF files in 5000' by 5000' tiles • Early Access orthos on SharePoint within 10 days • Separate delivery of Hardee and DeSoto counties to FDOR , including metadata and seamlines • DEM used for ortho generation in in LAS 1.4 PDRF 6 with associated metadata in WKT • Metadata files for each tile, seamlines, DEM and project wide (four formats)
Dates	• Early Access orthos online within 10 business days • Project delivery within 120 days of acquisition • Acquisition from December 2016 to February 2017 • First delivery April 11, 2017; last delivery June 14, 2017
Subcontractors	None
Challenges	• Flight cannot occur before Dec. 15 – We committed a minimum of 2 aircraft to project • Flight window ends 2/28 but every attempt should be made to complete by 1/31.
Highlights	• CPMS SharePoint site with status map, flight tracker, and calendar • Early access ortho images (EAOI) to CPMS site five days after flight

Reference #2

Client / Project	Contact	Surdex Project Manager
Texas Statewide Digital Orthoimagery	Gayla Mullins Remote Sensing Specialist TNRIS (512) 463-7104 gayla.mullins@twdb.texas.gov 1700 N. Congress Avenue Austin, TX 78701	Cornell Rowan **Contract Amount** $3,110,000

Project Narrative

Surdex produced 0.5 meter 4-band digital orthophotography over the entire state of Texas. Acquisition was late 2014 through spring of 2015, during leaf-off conditions, at a AGL of 20,505'. Projection was UTM Zones 13, 14 & 15, NAD 1983 (2011), Meters for the 0.5 meter imagery. The Digital Elevation Model (DEM) was updated as needed. Several metropolitan areas elected higher resolution 12" and 6" GSD imagery.

Year	Sensor	GSD	~Sq. Mi.	Acquisition Conditions	Notes
2014-2015	ADS100	0.5 M	~275,000	Leaf-off	4-band digital orthoimagery
		1.0'	~7,078		
		0.5'	~7,048		

Project Deliverables	• 0.5 meter four-band digital orthoimagery of entire state of Texas • 1.0' and 0.5' GSD "buy-up" orthoimagery over select metropolitan areas • Uncompressed GeoTIFF and JPEG2000 0.5M DOQQ tiles, 4-band • Metadata files conforming to FGDC standards • Mosaic seamlines
Dates	2014-2015
Subcontractors	• North West Geomatics Ltd. – 22,127 Line Miles of 0.5 meter and 0.5' acquisition • Merrick and Company – Surveyed 170 ground control points in the southern portion of the state of Texas • InMaSS - Surveyed 170 ground control points in the southern portion of the state of Texas
Challenges	• Getting into active Military Operating Areas (MOA) to acquire imagery • Acquiring the proper permits to acquire imagery south of the Texas/Mexico border
Highlights	• Acquiring 91 % of the Statewide imagery by August 05, 2015 when the notice to stop acquisition for the season was received • Completing the 9% image acquisition between December 15, 2015 and February 02, 2016

Reference #3

Client / Project	Contact	Surdex Project Manager
State of North Carolina **Digital Orthoimagery Project**	Tim Johnson, CGIA Director (919) 754-6588 tim.johnson@nc.gov CGIA-State of North Carolina 3700 Wake Forest Road Raleigh, NC 27609	Wade Williams **Contract Amount** 2012: $770,819 2013: $874,352 2014: $507,887 2015: $451,899 2016: $689,595 2017: $638,990

Project Narrative

Surdex has served as a prime contractor for six consecutive years (2012-2017). This included the change from DMC-1 imagery acquisition to ADS100 acquisition, signaling the first time the State of North Carolina accepted the use of pushbroom sensor imagery. Surdex has consistently aided the State in updating the statewide specifications, particularly in the incorporation of pushbroom specifications.

Year	Sensor	GSD	≈ Sq. Mi.	Acquisition Conditions	Notes
2012	DMC	6”	4,102	Clear, Coastal Region	1”=200’ mapping scale
2013	DMC	6”	4,527	Clear, Rural/Suburban Regions	1”=200’ mapping scale
2014	ADS100	6”	2,184	Clear, Mountain/Suburban Regions	1”=200’ mapping scale
2015	ADS100	6”	2,144	Clear, Mountain/Suburban Regions	1”=200’ mapping scale
2016	ADS100	6”	3,990	Clear, Coastal/Suburban Regions	1”=200’ mapping scale
2016	ADS100	6”	3,650	Clear, Rural/Suburban Regions	1”=200’ mapping scale

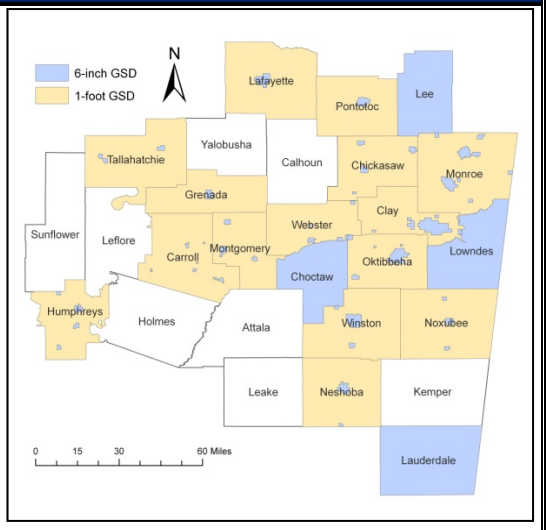
Project Deliverables	• 6” color digital orthoimagery in Geotiff/TFW format • Mosaic cutlines in .SHP format and project metadata
Dates	• 2012: December 2011 – November 2012 • 2013: December 2012 – November 2013 • 2014: December 2013 – November 2014 • 2015: December 2014 – November 2015 • 2016: December 2015 – November 2016 • 2017: December 2016 – Present
Subcontractors	• ESP-Survey • IMC/CRM-Orthophoto QA/QC
Highlights	All deliverables were shipped on time, and below budgeted costs.

Reference #4

Client / Project	Contact	Surdex Project Manager
Northeast Mississippi **(sub to Yelverton Consulting)**	Joel Yelverton Yelverton Consulting (601) 573-1135 joel.yelverton@yelvertonconsulting.com 113 Green Oak Cove Clinton, Mississippi 39056	Cornell Rowan **Contract Amount** $426,000

Project Narrative

Surdex Corporation was selected to produce varying resolutions of orthoimagery over a 19-county area in northeast Mississippi, with acquisition beginning in early 2014 using the ADS100. This involves numerous individual partners from local government and the State of Mississippi – including separate contracts with each and every county. Resolutions of the orthoimagery varied from 6-inch to 1-foot, with numerous small pockets at 6-inch. At the time of this submission, approximately 85% of the deliverables have been provided to the third-party QC contractor.



Since there was not a single point of contact at the state or local government level, please note that the point of contact for this reference is Mr. Joel Yelverton. He serves as the Director of the Mississippi Assessors and Collectors Association, which commissioned him to represent their interest coordination multi-county regional orthoimagery projects for continuity and efficiency. Mr. Yelverton spearheaded the cooperation between local and state government departments and this program is in its third year. He reports the program's progress at each quarterly meeting of the Mississippi Coordinating Council for Remote Sensing and Geographic Information Systems (MCCRSGIS).

Year	Sensor	GSD	≈ Sq. Mi.	Acquisition Conditions	Notes
2014	ADS100	6”	2,240	Leaf-off (January-March)	4-band orthoimagery
		1’	8,418		

Project Deliverables	• 4-band orthoimagery in World TIFF format • Mosaic seamlines in shapefile format • MrSID tiles and mosaics • Metadata
Dates	2014
Subcontractors	Gustin, Cothem & Tucker (ground survey)
Challenges	• Contractual arrangements with each of the 19 counties • Challenging weather conditions, including controlled burns • Mixed orthoimagery resolutions
Highlights	• Met acquisition timeline using 3 ADS100’s • Deliveries proceeding up to 3 months ahead of schedule

Reference #5

Client / Project	Contact	Surdex Project Manager
Iowa Statewide Digital Orthoimagery Project	Jon Paoli, GIS/Information Technology Coordinator Iowa Homeland Security & Emergency Management Joint Forces Headquarters State of Iowa 6100 NW 78th Ave. Johnston, IA 50131 (515) 323-4384 jonathan.paoli@iowa.gov	Cornell Rowan **Contract Amount** $1,297,875

Project Narrative

This project was to obtain statewide digital orthoimagery at 12”/30cm during the Spring of 2016. The eastern half of the state was the first priority in 2016 before opening the western half. A pilot was conducted covering the Linn County/Cedar Rapids area to establish project color/tone and confirm the client’s expectations.

Surdex uploaded the orthoimagery to SurCheck (our online imagery review and approval tool) after the pilot sample was approved; all imagery was posted to SurCheck by September 30 for the client’s inspection.

Surdex provided all imagery to an Open Geospatial Consortium (OGC) Web Map Service (WMS) to allow Internet viewing of the imagery as soon as possible. The intent was to let the State and participants have early use of the imagery, as well as let the user community follow production progress. Each individual county’s final product set was delivered in its entirety to Iowa HSEMD separately, on a portable hard drive.

Year	Sensor	GSD	≈ Sq. Mi.	Acquisition Conditions	Notes
2016	ADS100	12”	55,857	Spring leaf-off	2,000’ boundary

Project Deliverables	• 12” GSD 4-band digital orthoimagery in uncompressed GeoTIFF • Metadata • ESRI shapefiles of survey control points and flight lines
Dates	March 16, 2016 – December 22, 2017
Subcontractors	WHKS Engineers – Planners – Land Surveyors
Challenges	Persistent cloud cover
Highlights	Acquiring and processing the imagery, creating the final deliverables and delivering 47% (45 Counties) of the statewide project in 2016

Section 5: Proposed Schedule

5.1 PROJECT SCHEDULE

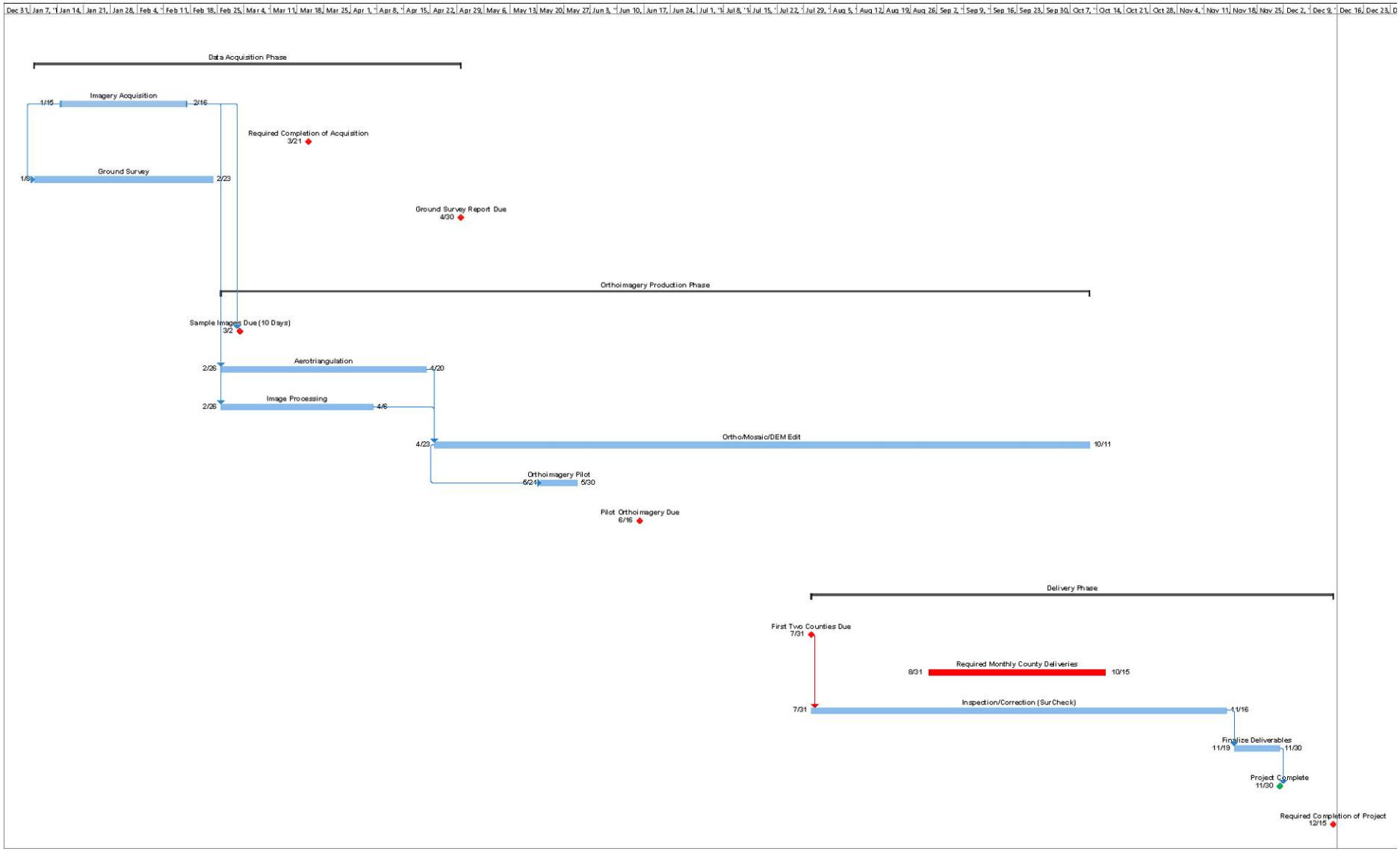
The Gantt chart on the following page presents our preliminary schedule for the 2018 project for our baseline approach. Assumptions behind this schedule include:

- A nominal acquisition window of mid-January through late-March.
- Our production schedule is based on a late-March acquisition completion. It is reasonable to assume that if acquisition completes earlier, production schedules will be correspondingly moved up. Similarly, if acquisition is completed after mid-March, it is reasonable to assume that production schedule will slip accordingly.
- Acquisition can take place any day of the week (weekends, holidays, etc.).
- Scheduling of deliverables (specific counties) will be done after acquisition, based on the consortium's priorities.

Summary of Required Project Milestones		
Item	**Date**	**Comments**
Administrative		
Contractor Selection	November 6, 2017	As anticipated by consortium
Contracts Preparation	November 6 – December 5, 2017	
Notice to Proceed	December 6, 2017	
Data Acquisition		
Completion of Acquisition	March 21, 2018	Weather/climate dependent, coordinated with consortium
Sample Raw Images	≤10 days of acquisition completion	Locations in coordination with consortium
Ground Control Report	April 30, 2018	In format coordinated with consortium. Approved by Team PLS registered in state of Mississippi
Orthoimagery Production		
Pilot Orthoimagery	June 16, 2018	Locations in coordination with consortium
Delivery and Acceptance		
Delivery of First Two Counties	By July 31, 2018	Counties selected in coordination with consortium
Final Acceptance All Ten Counties	December 15, 2018	Monthly delivery for multiple counties. Effectively requires final deliveries by mid-November to allow for inspection and remedial action by Surdex.

5.2 PRELIMINARY SCHEDULE GANTT CHART

RFP milestone specifications are highlighted in **red** in the following graphic.



Section 6: Fee Proposal

6.1. ATTACHMENT C: FEE PROPOSAL FORM

Project: MS ORTHO 2018 Digital Orthophotography

Respondent: **Surdex Corporation**

	Pixel Resolution		Square Miles		Cost Per Square Mile			Optional 6 inch Countywide		
County	County-wide	Town	County-wide	Town 100' Scale	County-wide	Town 100' Scale	Total Cost	Yes/No	Square Mile Cost	Total Cost
Adams	6 inch	6 inch	512	N/A	$ 81	$ ---	$ 41,472	N/A	$ 81	N/A
Coahoma	12 inch	6 inch	638	35	$ 30	$ 160	$ 24,740	No	$ 81	N/A
Copiah	12 inch	6 inch	799	22	$ 30	$ 210	$ 28,590	No	$ 81	N/A
Lamar	6 inch	6 inch	516	N/A	$ 81	$ ---	$ 41,796	N/A	$ 81	N/A
Lawrence	12 inch	6 inch	450	17	$ 30	$ 250	$ 17,750	No	$ 81	N/A
Lincoln	12 inch	6 inch	711*	74	$ 30	$ 150	$ 32,430	No	$ 81	N/A
Madison	6 inch	6 inch	766	N/A	$ 81	$ ---	$ 62,046	N/A	$ 81	N/A
Pike	12 inch	6 inch	508*	132	$ 30	$ 100	$ 28,440	No	$ 81	N/A
Prentiss	12 inch	6 inch	432	21	$ 30	$ 215	$ 17,475	No	$ 81	N/A
Quitman	12 inch	6 inch	421	13	$ 30	$ 300	$ 16,530	No	$ 81	N/A
A 400+ sq. mi. County	6 inch	N/A	400	1"=100'	$ 81.00					
A 4 sq. mi. urban area	N/A	3 inch	N/A	1"=50' 4 sq. mi.	N/A	$ 500				

Section 7: Sample Orthophotography

On the enclosed USB, we are providing multiple sample imagery and product metadata samples from the following projects:

Sample #1: 6-inch_Greene-Co_MS	
Description:	The 6" GSD 4-band digital orthoimagery sample (two GeoTIFF tiles) was acquired using the ADS100 for the Mississippi 2017 project. The sample includes a mix of urban / rural areas, secondary roads, farmland, forests, etc.
Location:	Greene County, MS
Map Scale:	1" = 100'
Accuracy Specifications:	The accuracy specifications that were met were established by ASPRS (American Society of Photogrammetry and Remote Sensing), specifically ASPRS Class 1 for 1" = 100' (6-inch pixel)
Camera System:	ADS100
Month/year date of imagery acquisition:	02/01/2017
Summarized Project Scope:	A consortium of 17 Counties within Mississippi (MS ORTHO 2017) contracted Surdex Corporation to acquire full color (four band) digital orthophotography during the acceptable leaf off/sun angle/weather aerial photography flight season of 2017. The base specifications are six-inch pixel resolution for 1" = 100' scale and 12 inch for 1" = 200' scale mapping. MS ORTHO 2017 orthophotography was acquired for the local County Governments with common needs for professional services in updating GIS products used in the assessment of taxable properties. The individual contracts for the 2017 imagery were agreements between Surdex and each of the participating County Governments.
Client Reference and Contact:	Joel Yelverton Yelverton Consulting (601) 573-1135 joel.yelverton@yelvertonconsulting.com 113 Green Oak Cove Clinton, Mississippi 39056

Sample #2: 12-inch_Washington-Co_MS	
Description	The 12" GSD 4-band digital orthoimagery sample (two GeoTIFF tiles) was acquired using the ADS100 for the Mississippi 2017 project. The sample includes a mix of urban / rural areas, secondary roads, farmland, forests, etc
Location:	Washington County, MS
Map Scale:	1" = 200'
Accuracy Specifications:	The accuracy specifications that were met were established by ASPRS (American Society of Photogrammetry and Remote Sensing), specifically ASPRS Class 1 for 1" =200' (12-inch pixel)
Camera System:	ADS100
Month/year date of imagery acquisition:	01/30/2017
Summarized Project Scope:	A consortium of 17 Counties within Mississippi (MS ORTHO 2017) contracted Surdex Corporation to acquire full color (four band) digital orthophotography during the acceptable leaf off/sun angle/weather aerial photography flight season of 2017. The base specifications are six-inch pixel resolution for 1" = 100' scale and 12 inch for 1" = 200' scale mapping. MS ORTHO 2017 orthophotography was acquired for the local County Governments with common needs for professional services in updating GIS products used in the assessment of taxable properties. The individual contracts for the 2017 imagery were agreements between Surdex and each of the participating County Governments.
Client Reference and Contact:	Mr. Blake Wallace Hinds County Economic Development Authority 125 South Congress, Suite 1500 Jackson, MS 39201

Section 8: Additional Information

8.1 Sensor Calibration Reports

Surdex is providing with our proposal digital copy of our proposal and the following Sensor Calibration Reports.

Surdex's ADS100 Sensors		
Serial #	**Calibration Date**	**IMU Make**
10510	06/21/2013	CUS6
10515	08/08/2016	CUS6
10522	12/16/2013	CUS6
10530	05/07/2014	CUS6
10552	04/30/2015	CUS6

8.2 Control and Flight Plans

As stated in Section 2/2.2.2.3 Project Control and Flight Design, we have provided the project area control and flight plan printed on an 11x17 copy and this is included on the USB included in our proposal. We are also providing the flight and control and shapefiles.

SURDCOR-02 JOPERRY

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
11/30/2017

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).

PRODUCER	CONTACT NAME:	
Arthur J. Gallagher Risk Management Services, Inc. 1525 Kautz Road Suite 100 West Chicago, IL 60185	PHONE (A/C, No, Ext): (630) 584-7552	FAX (A/C, No): (630) 584-2099
	E-MAIL ADDRESS:	

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Mitsui Sumitomo Insurance USA Inc.	22551
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED

Surdex Corporation
Surdex Corporation
520 Spirit of St. Louis Blvd.
Chesterfield, MO 63005

COVERAGES **CERTIFICATE NUMBER:** **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	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	CLAIMS-MADE OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$
	OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$
	DED RETENTION $							$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						PER STATUTE OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N (Mandatory in NH)	N / A		WCP9112249	12/31/2016	12/31/2017	E.L. EACH ACCIDENT	$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000

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

CERTIFICATE HOLDER

Madison County, MS
P.O. Box 229
Magnolia, MS 39652

CANCELLATION

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

Patrick M. Gallagher

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 11/29/2017

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 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).

PRODUCER

Weiss Insurance Agency, Inc.
683 Trade Center Blvd
Suite 100
Chesterfield MO 63005

CONTACT NAME: Hollie Lauer
PHONE (A/C, No, Ext): (636)534-7221 FAX (A/C, No): (636)534-7921
E-MAIL ADDRESS: hollielauer@weiss-ins.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : AMCO Insurance Company	19100
INSURER B : Nationwide Mutual Ins Co	23787
INSURER C : Allied Insurance Company	
INSURER D : AXIS Insurance	
INSURER E :	
INSURER F :	

INSURED

SURDEX CORPORATION
520 SPIRIT OF SAINT LOUIS BLVD
CHESTERFIELD MO 63005-1002

COVERAGES CERTIFICATE NUMBER: CL1612129604 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	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: X POLICY PRO-JECT LOC OTHER:			ACPGLAO7192478791	01/01/2017	01/01/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG Other Perm not sep sent	$ 1,000,000 $ 100,000 $ 5,000 $ 1,000,000 $ 2,000,000 $ 2,000,000 $
B	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS X HIRED AUTOS X NON-OWNED AUTOS			ACPBA7192478791	01/01/2017	01/01/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) APLUS	$ 1,000,000 $ $ $ $
C	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $			ACPCAA7192478791	01/01/2017	01/01/2018	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $ 5,000,000 $
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A					PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ $ $
D	Professional Liability			ECN000179971701	01/01/2017	01/01/2018	Each Wrongful Act Total Limit of Insuracne	$2,000,000 $2,000,000

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

CERTIFICATE HOLDER

Madison County, MS
PO Box 292
Canton, MS 39046

CANCELLATION

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

Matthew Weiss/LAUER

STATE OF MISSISSIPPI
SECRETARY OF STATE'S OFFICE
C. DELBERT HOSEMANN, JR.
SECRETARY OF STATE
JACKSON, MISSISSIPPI

September 8, 2017

Mr. Blake Wallace
Hinds County Economic Development Authority
Post Office Box 245
Jackson, MS 39205

Dear Mr. Wallace,

I, Delbert Hosemann, Secretary of State, do hereby certify the

APPROVAL OF THE INTERLOCAL AGREEMENT BETWEEN THE COUNTIES OF ADAMS, COAHOMA, COPIAH, LAMAR, LAWRENCE, LINCOLN, MADISON, PIKE, PRENTISS, RANKIN, AND QUITMAN TO BE KNOWN AS THE MISSISSIPPI ORTHO 2018 AERIAL PHOTOGRAPHY UPDATE INITIATIVE 2017-2018 (MS ORTHO 2018) AND IS FOR THE PURPOSE OF ALLOWING THE PARTICIPATING COUNTIES TO COLLECTIVELY SEEK BIDS FOR AND ACQUIRE AERIAL PHOTOGRAPHY SERVICES FOR TAX ASSESSMENT PURPOSES

was recorded in this office in the Records of Incorporation; the Interlocal Corporation Act File; and is located in Photostat Book 403.

GIVEN UNDER MY HAND AND THE GREAT SEAL OF THE STATE OF MISSISSIPPI HERETO AFFIXED, THIS 8TH DAY OF SEPTEMBER, 2017

C. Delbert Hosemann, Jr.

C. Delbert Hosemann, Jr.

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable Calvin Butler, Vice President
Adams County Board of Supervisors
314 State St.
Natchez, Mississippi 39120

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Butler:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable Paul Pearson, President
Coahoma County Board of Supervisors
Post Office Box 579
Clarksdale, Mississippi 38614

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Pearson:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable Terry Channell, President
Copiah County Board of Supervisors
Post Office Box 551
Hazelhurst, Mississippi 39083

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Channell:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable Joe Bounds, President
Lamar County Board of Supervisors
Post Office Box 1240
Purvis, Mississippi 39475

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Bounds:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable Steve Garrett, President
Lawrence County Board of Supervisors
Post Office Box 1160
Monticello, Mississippi 39654

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Garrett:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable Bobby Watts, President
Lincoln County Board of Supervisors
301 S. First Street
Brookhaven, Mississippi 39601

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Watts:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable David Bishop, President
Madison County Board of Supervisors
125 N. West Street
Canton, Mississippi 39046

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Bishop:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable Luke Brewer, President
Pike County Board of Supervisors
Post Office Box 431
Magnolia, Mississippi 39652

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Brewer:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable Matt Murphy, President
Prentiss County Board of Supervisors
349 CR 7100
Booneville, Mississippi 38829

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Murphy:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

OPINIONS
DIVISION

September 7, 2017

The Honorable Manuel Killebrew, President
Quitman County Board of Supervisors
220 Chestnut Street, Suite 3
Marks, Mississippi 38646

Re: Interlocal Agreement Between the Counties of Adams, Coahoma, Copiah, Lamar, Lawrence, Lincoln, Madison, Pike, Prentiss, Rankin, and Quitman to be Known as the Mississippi Ortho 2018 Aerial Photography Update Initiative 2017-2018 (MS Ortho 2018) and is for the Purpose of Allowing the Participating Counties to Collectively Seek Bids for and Acquire Aerial Photography Services for Tax Assessment Purposes

Dear Mr. Killebrew:

Attorney General Jim Hood received a request to review and approve the above referenced interlocal agreement (the Agreement).

We have examined the Agreement pursuant to the Interlocal Cooperation Act of 1974 and find it to be in proper form and compatible with state law, and it is hereby approved.

Prior to its being in force, the Agreement must be filed with the Chancery Clerk of each of the participating counties and the Secretary of State.

Sincerely,

JIM HOOD, ATTORNEY GENERAL

By:

Phil Carter
Special Assistant Attorney General

550 HIGH STREET - POST OFFICE BOX 220 - JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 - FACSIMILE (601) 359-5025

MS ORTHO 2018 Aerial Photography Update Initiative 2017-2018 Interlocal Agreement

State of Mississippi

County of Adams
County of Coahoma
County of Copiah
County of Lamar
County of Lawrence
County of Lincoln
County of Madison
County of Pike
County of Prentiss
County of Rankin
County of Quitman

Interlocal Cooperation Agreement

This agreement is made among the Board of Supervisors, of the respective counties as set forth hereinafter, pursuant to the Interlocal Cooperation Act of 1974, Section 17-13-3 et seq., Mississippi Code of 1972, as amended.

As the purpose of this Interlocal Agreement is to collectively seek and procure services to conduct Aerial Photography and Survey of the eleven (11) named counties as directed under section 27-35-101 Mississippi Code 1972 as required for compliance with section 27-35-113 Mississippi Code 1972 at a substantially reduced cost to the Tax Payers.

I. Title

This joint agreement between the aforementioned cooperative counties shall be known as MS ORTHO 2018.

II. Statutory Authority.

Counties are individually authorized to engage in Aerial Photography and Survey as allowed under section 27-35-101 Miss. Code 1972. Section 17-13-3 Miss. Code 1972, allows the cooperative activity under section 27-35-113 Miss. Code 1972.

III. Duration

This agreement shall continue in force and effective from date of its approval until all work is complete and accepted by all parties but no longer than the current term of any Board of Supervisors which is a party hereto.

IV. Purpose

The purpose of this agreement is to allow the participating counties to collectively bid for and receive services that are like in kind and required by statute that would otherwise be more costly or prohibitive to contract for separately. Ultimately, the expressed purpose is to acquire Aerial Photography for Assessment purposes at a substantially reduced cost to the Tax Payer. By acting in concert there is reason to believe the group will benefit from other Government bodies wanting access to the completed project.

V. Administration

For the ease of administration, Blake Wallace, Executive Director of the Hinds County Economic Development Authority will co-ordinate bid processes and act as single point of contact for all Counties and potential vendors. Each County shall be responsible for approving its portion of any bids received and will be responsible for cost associated with the Initiative incurred for their county only. In the case that any other Government Bodies provide assistance funding for project completion it will be up to that entity to describe the nature and distribution of funding.

VI. Financing

It will be the responsibility of each County to arrange for contract and financing with the agreed upon vendor based on contract bid acceptance.

VI. Termination

This agreement may be terminated as to any county at any time with the adoption of an Order by the county. In such an event the Agreement will have no further effect on that county from the effective date of the Order. The terminating county will resolve any contractual issues with the vendor independently. Dependent on the timing of termination other counties may have to re-bid or negotiate with the vendor(s).

VII. Bid for Services

There will be a final agreed upon bid for basic services. Said bid will be the basis for fees paid by participating counties. Base service will be but not limited to, Rectified

Orthographic Photography to agreed specifications. Each county will individually contract for additional services as required by their jurisdiction.

VIII. Contracting

Each County will ultimately be responsible for the final contract and payment agreements with the approved vendor. This agreement does not bind any county for any other counties' obligations or debts.

IX. Additional Jurisdiction

Should any other county or other government body wish to join this agreement they may do so in writing, agreeing to all terms and conditions prior to the completion of the project.

Calvin Butler

Calvin Butler, Vice President
Adams County Board of Supervisors
314 State St., Natchez, MS 39120

Date: 9-1-17

ATTEST:

Brandi Lewis PBD

Brandi Lewis
Chancery Clerk

CHANCERY CLERK
ADAMS COUNTY, MISS.

Date: 9-1-17

Paul Pearson, President
Coahoma County Board of Supervisors
PO Box 579, Clarksdale, MS 38614

Date: 8-16-17

ATTEST:

CHANCERY COURT OF COAHOMA COUNTY, MISS.

Carolyn Parham
Chancery Clerk

Date: 8-16-17

Terry Channell, President
Copiah County Board of Supervisors
P O Box 551, Hazlehurst, MS 39083

Date: 8/21/17

ATTEST:

CHANCERY COURT
COPIAH COUNTY, MS

Steve Amos by Ronnie Barlow, D.C.
Steve Amos
Chancery Clerk

Date: 8/21/17

Joe Bounds, President
Lamar County Board of Supervisors
PO Box 1240, Purvis, MS 39475

Date: 8/17/17

ATTEST:

CHANCERY CLERK * LAMAR COUNTY, MISSISSIPPI *

Wayne Smith
Chancery Clerk

Date: 8/17/17

Steve Garrett, President
Lawrence County Board of Supervisors
P O Box 1160, Monticello, MS 39654

Date: 8/21/17

ATTEST:

Kevin Rayborn
Chancery Clerk

CHANCERY CLERK
LAWRENCE COUNTY, MS

Date: 8/21/17

Bobby Watts, President
Lincoln County Board of Supervisors
301 S. First St, Brookhaven, MS 39601

Date: 8-21-17

CHANCERY COURT * LINCOLN COUNTY, MISS.

Tillmon Bishop
Chancery Clerk

Date: 8-21-17

David Bishop ~~Trey Baxter~~, President
Madison County Board of Supervisors
125 N West St., Canton, MS 39046

Date: 9/5/17

ATTEST:

Ronny Lott
Chancery Clerk

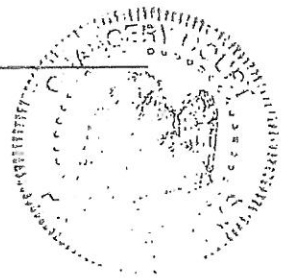
Date: 9/5/17

Luke Brewer, President
Pike County Board of Supervisors
PO Box 431, Magnolia, MS 39652

Date: 8-25-17

ATTEST:

Becky Buie
Chancery Clerk



Date: 8-25-17

Matt Murphy, President
Prentiss County Board of Supervisors
349 CR 7100, Booneville, MS 38829

Date: August 23rd, 2017

BOARD OF SUPERVISORS SEAL PRENTISS COUNTY, MISS.

ATTEST:

Bubba Pounds
Chancery Clerk

Date: August 23rd, 2017

Manuel Killebrew, President
Quitman County Board of Supervisors
220 Chestnut st., Suite 3, Marks, MS 38646

Date: 08-21-17

ATTEST:

Butch Scipper
Chancery Clerk

CHANCERY COURT
BUTCH SCIPPER
CHANCERY CLERK
QUITMAN COUNTY, MS

Date: 8/21/17

Response to RFP (Evaluation and Ranking)

MS Ortho 2018

FIRM	% Weight =>	1 0.25	2 0.25	3 0.20	4 0.15	5 0.00	6 0.15	SCORE	RANK
	RATE								
Fugro	VALUE	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	1
	RATE								
Kucera	VALUE	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	1
	RATE								
Quantum Spatial	VALUE	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	1
	RATE								
Sanborn	VALUE	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	1
	RATE								
Surdex	VALUE	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	1

Criteria

1 = Technical Approach, Quality Control
2 = Technical Expertise, Digital Camera System, Staff Qualifications, Schedule and Availability and Sample Digital Orthophoto
3 = Professional Registration, Business Registration and Firm Background
4 = Similar Project Experience
5 = Other Services (Not Scored)
6 = Fee

Rate = 1 - 10 [with 10 being the highest]

10 = The firm's qualifications are **Excellent**

6 - 9 = The firm's qualifications are **Good**

3 - 5 = The firm's qualifications are **Fair**

Evaluation File

1 = The firm's qualifications are **Poor**

Grader #1

Response to RFP (Evaluation and Ranking)

MS Ortho 2018

FIRM	% Weight =>	1 0.20	2 0.20	3 0.20	4 0.15	5 0.00	6 0.25	SCORE	RANK
	RATE	6.00	7.00	7.00	5.00	0.00	9.00		
Fugro	VALUE	1.20	1.40	1.40	0.75	0.00	2.25	**7.00**	3
	RATE	5.00	4.00	4.00	5.00	0.00	7.00		
Kucera	VALUE	1.00	0.80	0.80	0.75	0.00	1.75	**5.10**	4
	RATE	7.00	6.00	8.00	5.00	0.00	10.00		
Quantum Spatial	VALUE	1.40	1.20	1.60	0.75	0.00	2.50	**7.45**	1
	RATE	4.00	3.00	3.00	5.00	0.00	6.00		
Sanborn	VALUE	0.80	0.60	0.60	0.75	0.00	1.50	**4.25**	5
	RATE	8.00	8.00	6.00	5.00	0.00	8.00		
Surdex	VALUE	1.60	1.60	1.20	0.75	0.00	2.00	**7.15**	2

Criteria

1 = Technical Approach, Quality Control
2 = Technical Expertise, Digital Camera System, Staff Qualifications, Schedule and Availability and Sample Digital Orthophoto
3 = Professional Registration, Business Registration and Firm Background
4 = Similar Project Experience
5 = Other Services (Not Scored)
6 = Fee

Rate = 1 - 10 [with 10 being the highest]

10 = The firm's qualifications are **Excellent**

6 - 9 = The firm's qualifications are **Good**

3 - 5 = The firm's qualifications are **Fair**

Grader #1

1 = The firm's qualifications are **Poor**

Grader #2

Response to RFP (Evaluation and Ranking)

MS Ortho 2018

FIRM	% Weight =>	1 0.20	2 0.20	3 0.20	4 0.15	5 0.00	6 0.25	SCORE	RANK
	RATE	7.00	6.00	7.00	7.00	0.00	9.00		
Fugro	VALUE	1.40	1.20	1.40	1.05	0.00	2.25	**7.30**	3
	RATE	6.00	5.00	5.00	8.00	0.00	7.00		
Kucera	VALUE	1.20	1.00	1.00	1.20	0.00	1.75	**6.15**	5
	RATE	8.00	7.00	9.00	9.00	0.00	10.00		
Quantum Spatial	VALUE	1.60	1.40	1.80	1.35	0.00	2.50	**8.65**	1
	RATE	5.00	8.00	6.00	8.00	0.00	6.00		
Sanborn	VALUE	1.00	1.60	1.20	1.20	0.00	1.50	**6.50**	4
	RATE	9.00	9.00	8.00	9.00	0.00	8.00		
Surdex	VALUE	1.80	1.80	1.60	1.35	0.00	2.00	**8.55**	2

Criteria

1 = Technical Approach, Quality Control
2 = Technical Expertise, Digital Camera System, Staff Qualifications, Schedule and Availability and Sample Digital Orthophoto
3 = Professional Registration, Business Registration and Firm Background
4 = Similar Project Experience
5 = Other Services (Not Scored)
6 = Fee

Rate = 1 - 10 [with 10 being the highest]

10 = The firm's qualifications are **Excellent**

6 - 9 = The firm's qualifications are **Good**

3 - 5 = The firm's qualifications are **Fair**

Grader #2

1 = The firm's qualifications are **Poor**

Grader #3

Response to RFP (Evaluation and Ranking)

MS Ortho 2018

FIRM	% Weight =>	1 0.20	2 0.20	3 0.20	4 0.15	5 0.00	6 0.25	SCORE	RANK
	RATE	7.00	9.00	8.00	7.00	0.00	8.00		
Fugro	VALUE	1.40	1.80	1.60	1.05	0.00	2.00	**7.85**	2
	RATE	7.00	8.00	7.00	6.00	0.00	5.00		
Kucera	VALUE	1.40	1.60	1.40	0.90	0.00	1.25	**6.55**	5
	RATE	8.00	8.00	7.00	7.00	0.00	8.00		
Quantum Spatial	VALUE	1.60	1.60	1.40	1.05	0.00	2.00	**7.65**	3
	RATE	7.00	9.00	8.00	8.00	0.00	5.00		
Sanborn	VALUE	1.40	1.80	1.60	1.20	0.00	1.25	**7.25**	4
	RATE	9.00	9.00	8.00	9.00	0.00	8.00		
Surdex	VALUE	1.80	1.80	1.60	1.35	0.00	2.00	**8.55**	1

Criteria

1 = Technical Approach, Quality Control
2 = Technical Expertise, Digital Camera System, Staff Qualifications, Schedule and Availability and Sample Digital Orthophoto
3 = Professional Registration, Business Registration and Firm Background
4 = Similar Project Experience
5 = Other Services (Not Scored)
6 = Fee

Rate = 1 - 10 [with 10 being the highest]

10 = The firm's qualifications are **Excellent**

6 - 9 = The firm's qualifications are **Good**

3 - 5 = The firm's qualifications are **Fair**

Grader #3

1 = The firm's qualifications are **Poor**

County	sq. mi. 12 in.	sq. mi. 6 in.	Fugro 12 in.	Fugro 6 in.	Fugro Total	Kucera 12 in.	Kucera 6 in.	Kucera Total	Quantum 12 in.	Quantum 6 in.	Quantum Total	Sanborn 12 in.	Sanborn 6 in.	Sanborn Total	Surdex 12 in.	Surdex 6 in.	Surdex Total	County
Adams	N/A	512	N/A	88.85	$45,491	N/A	95.00	$48,640	N/A	69.50	$35,584	N/A	95.91	$49,106	N/A	81.00	$41,472	**Adams**
Coahoma	638	35	30.68	88.85	$22,684	35.00	225.00	$30,205	29.50	250.00	$27,571	30.23	272.55	$28,826	30.00	160.00	$24,740	**Coahoma**
Copiah	799	22	30.68	88.85	$26,468	34.00	215.00	$31,896	29.50	250.00	$29,071	30.23	272.55	$30,150	30.00	210.00	$28,590	**Copiah**
Lamar	N/A	516	N/A	88.85	$45,847	N/A	95.00	$49,020	N/A	69.50	$35,862	N/A	95.91	$49,490	N/A	81.00	$41,796	**Lamar**
Lawrence	450	17	30.68	88.85	$15,316	35.00	225.00	$19,575	29.50	280.00	$18,035	30.23	272.55	$18,237	30.00	250.00	$17,750	**Lawrence**
Lincoln	711	74	30.68	88.85	$28,388	35.00	200.00	$39,685	29.50	200.00	$35,775	30.23	272.55	$41,662	30.00	150.00	$32,430	**Lincoln**
Madison	N/A	766	N/A	88.85	$68,059	N/A	90.00	$68,940	N/A	69.50	$53,237	N/A	95.91	$73,467	N/A	81.00	$62,046	**Madison**
Pike	508	132	30.68	88.85	$27,314	35.00	200.00	$44,180	29.50	170.00	$37,426	30.23	272.55	$51,333	30.00	100.00	$28,440	**Pike**
Prentiss	432	21	30.68	88.85	$15,120	35.00	220.00	$19,740	29.50	250.00	$17,994	30.23	272.55	$18,783	30.00	215.00	$17,475	**Prentiss**
Quitman	421	13	30.68	88.85	$14,071	35.00	225.00	$17,660	29.50	280.00	$16,060	30.23	272.55	$16,270	30.00	300.00	$16,530	**Quitman**
Totals					**$308,758**			**$369,541**			**$306,615**			**$377,324**			**$311,269**	
All 6 inch Co.				88.85			98.00			69.50			85.00			81.00		
3 inch				2635.44			450.00			1,100.00			1,037.45			500.00		
Evaluation Score				**22.15**	/ by 3 = 7.38		**17.80**	/ by 3 = 5.93		**23.75**	/ by 3 = 7.92		**18.00**	/ by 3 = 6.00		**24.25**	/ by 3 = 8.08	
Notes			2 ADS100: 30% sidelap GC: adequate DEM: existing & autocorrelate CP: 3 on team MS PLS, in-house China prod.: 20 yrs: Fugro owned Fugro Access: Web viewer 4 ADS80 back-up China: AT thru Ortho			2 ADS100; 2 UCE100: 35% sidelap GC: extensive: 170 pts DEM: Lidar & autocorrelate No offshore services proposed MS PLS not noted; 2 CP on team			4 ADS100: 30% sidelap GC: extensive DEM: Lidar & autocorrelate MS PLS 2: CP: 3 on team Ortho: India; SECON:ortho after AT VOICE: web viewer			3 UCE100: 80% end for 6":30% side excellent discussion bldg lean No offshore services proposed MS PLS: 3 CP on team DEM: Lidar & autocorrelate GeoServe web viewer GC: extensive: 91 pts + 61 check Avioimage as backup resource			5 ADS100: 30% sidelap GC: extensive: 190 pts: OPUS DEM: Lidar, update by APM in-house GC. MS PLS 3 CP on team No offshore services proposed SurCheck: web viewer		
Tel.Clarifications			"existing" DEM is Lidar						PAR (sub)has DMC: backup only						MS PLS: same as past years: GCT			