



# Statewide Aerial Imagery and Mapping Specifications

Alabama Geographic Information Office  
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# Request for Proposal

## 1.0 Purpose/Introduction

The Alabama Geographic Information Office (AGIO) is establishing a program to obtain, color digital, high-resolution aerial imagery and ancillary products for the State of Alabama (“State”). The imagery will be orthorectified and made map accurate according to American Society of Photogrammetry and Remote Sensing (ASPRS) map accuracy standards. The primary intent for this project is to collect new statewide aerial photography on a regular 3-year cycle at 1 foot pixel resolution. AGIO may also contract for various buy-up options, described below as part of the procurement. This RFP will improve the ability of our State to timely acquire imagery, reduce the cost of imagery by maximizing the collective purchasing power, and improve the imagery coverage for our state.

### 1.1 Proposed Milestones (Annually for 3-years)

Sept 2016 – Oct 2016	Qualification Based Selection, Award and Contracting
Oct 2016 – Dec 2016	Pre-Flight Planning, Validation Range Processing, Camera Systems Acceptance
Dec 2016 – Mar 2017	Control Surveys, Imagery Acquisition, Image Post Processing, & GNSS-IMU Post Processing
Mar 2017 – Jun 2017	Aerotriangulation & Orthophoto Product Generation
Jul 2017 – Oct 2017	Quality Review Production and Final TIFF Product Delivery
Dec 2017	Product Distribution Period (60 Day Review Cycle)

## 2.0 OVERVIEW OF REQUIRED SERVICES

There are three (3) primary intents for the project. They are:

1. Provide a new statewide digital orthophoto base map accurate to the latest ASPRS standards ([http://www.asprs.org/wp-content/uploads/2015/01/ASPRS\\_Positional\\_Accuracy\\_Standards\\_Edition1\\_Version100\\_November2014.pdf](http://www.asprs.org/wp-content/uploads/2015/01/ASPRS_Positional_Accuracy_Standards_Edition1_Version100_November2014.pdf)).
2. Provide project/program management and reporting services for all project phases.
3. Perform independent QA/QC services to ensure high quality data is received in the timely manner.

The vendor shall propose the recommended solution. Alternative or optional solutions, in addition to the recommended solution are encouraged.

The state has offered local partners the following buy-up option for the orthophoto products:

1. Improve the resolution of the final digital orthophotography. This buy-up option would change the map scale from 1”=200’ to 1”=100’ and would change the pixel resolution from 1.0’ to 0.50’.
2. Improve the resolution of the final digital orthophotography. This buy-up option would change the map scale from 1”=200’ to 1”=50’ and would change the pixel resolution from 1.0’ to 0.25’.

3. Provide adjustments in the aerial photography mission and resultant orthophoto production processes to build a near true ortho product over locally designated areas. This will require an adjustment in both forward overlap and sidelap and may also require “spot shots” to be captured over specified structures (buildings and bridges). This would be done for areas no less than 1 square miles in size.

In addition to the orthophoto buy up option, there are several supplemental products for which pricing is requested. These include

1. LiDAR
2. Oblique Imagery
3. Planimetric Mapping
4. Land Cover/Land Use Mapping
5. Impervious Surface Mapping
6. Emergency Response acquisition requests.

More detailed information about the derivative buy ups is described in section \_\_\_\_.

### **3.0 Project Area**

This scope of work is for the collection of imagery and other related data for the State of Alabama or as specified by the State of Alabama.

- The entire perimeter of the State must be buffered by a minimum distance of 1,000 feet.
- Riparian boundaries marked by the rivers (the states of Georgia to the east and Florida to the south) must be buffered by a minimum distance of 1,000 feet or to the opposite river bank, whichever distance is greater.
- The State shoreline with the Gulf of Mexico must be buffered by a minimum distance of 2,500 feet or as specified by the State. Imagery must cover the entire Gulf of Mexico beach of the State of Alabama extending from the Florida State Line at Perdido Key to the west end of Fort Morgan Peninsula in Baldwin County and the entire length of Dauphin Island in Mobile County. In addition, photography should include the complete western and eastern ends of Fort Morgan and Dauphin Island, respectively. Alongshore bar and dry beach features must be clearly visible. Also, include all of Pelican Island that joins Dauphin Island on the Gulf Side. The acquisition must be flown at or within two hours of the low tide for the day. If low tides occur during dark or unsuitable conditions, data acquisition may take place during a neap tide.

The base orthophotography products may include all 67 counties at 1-foot pixel resolution. Standard imagery products will be captured and delivered in three (3) areas each of them completed annually. Statewide imagery may not be captured in a single calendar year but divided equally over the three year period and processed respectively. Every effort should be made to capture imagery in leaf-off conditions within the shortest possible time frame.

### **4.0 Scope of Work Overview**

The State’s desire is to have a statewide imagery program, and to have an independent QA/QC process built into this program. The QA/QC services may be provided by the Task Order Contractor or by a subcontractor to the Task Order Contractor. The State reserves the right to award a separate contract for independent QA/QC services in addition to those provided by the

Task Order Contractor as part of this Task Order Contract. The State also will establish an internal QC team and will provide an opportunity for its local partners to review the data products provided. The State reserves the right to modify the Scope of Work at its own discretion.

The Scope of Work (“Work”) for this project will include the following services unless other specified by the State of Alabama:

- Multi-spectral Aerial Photography Acquisition using either a linear or area array CCD-based digital sensor
- Image Processing for both Color and Near IR Raw TIFF Images
- Survey Control
- Aerial Triangulation
- Development of a DEM to support orthorectification (*Note: The DEM must be able to support orthorectification and is not required to support contour modeling or other DTM applications within the State*). DEM development shall be based on State provided LiDAR if available. New DEM collection or USGS NED data shall be used to supplement State provided LiDAR as needed or in the absence of LiDAR.
- Production of 1”=200’ Digital Orthophotography in both Color and Near IR at a 1.0’ Ground Pixel Resolution that meets or exceeds the ASPRS Class I Accuracy Standards for 1”=200’ scale mapping.
- Quality Assurance and Quality Control of all deliverable products
- Development of a Web-based QA/QC application for stakeholder (State and County) data review
- FGDC Compliant metadata
- Project Management including:
  - Preflight Initiation Meeting
  - Pilot Review Meeting
  - Production Meetings (as needed)
  - Weekly Progress Reporting
  - Weekly Coordination Teleconferences
  - Development and maintenance of a project management website

The specifics for each work area plus the required deliverables are outlined throughout this document.

## **5.0 Requesting Agency Background**

The AGIO, Geographic Information Officer is sponsoring this program on behalf of state, county, and local governments who use these digital data for many purposes. These data will be available to our partners for use in many applications and viewable to the public. The GIO will be relying on federal, state, county, and local government agencies to assist in project development, project oversight, and inspection of deliverables.

## **6.0 Roles and Responsibilities**

Defined personnel roles and responsibilities under the Task Order.

- Task Order Manager – State Geographic Information Officer (GIO) will be responsible for project oversight at the state level. See Section on Administration Information.
- Task Order Contractor – Consulting and Technical Services (CATS) awarded the Task Order Agreement. The Task Order Contractor shall provide human resources as necessary to perform the services described in the Scope of Work. The Task Order Contractor will be required to meet fully the terms, conditions, and requirements of the Task Order.

## **7.0 Requirements**

There are three functional areas covered under these specifications related to collecting, processing and delivering aerial imagery and related optional products:

1. Project Management (see section 7.10)
2. Aerial Imagery Collection Processing and Delivery (see section 7.2)
3. Quality Assurance and Quality Control (see sections 8.1.27 and 8.1.28)

### **7.1 Project Management**

The Task Order Contractor shall assign an experienced project manager to the project. The project manager shall work with the State’s Task Order Manager to ensure the successful implementation and completion of the project.

The Task Order Contractor shall follow the Project Management Institute (PMI) methodology for managing projects. The State’s expectations for project management include:

- Assignment of experienced project manager (relative to the defined task)
- Attendance at required project meetings
- Weekly status reports and communication
- Managing and updating of project schedule and project web site
- Validation of project deliverables for completeness, accuracy and timeliness
- Proactive identification of any issues effecting schedule, delays and/or quality
- Responsive to client emails and phone calls within one (1) business day
- Project management experience of at least three years
- Successful project management experience on projects of similar scope (orthophotography, LiDAR, etc) and size (in square miles)
- Experience working with multiple prime and sub-contractors on similar projects.

The project manager shall ensure that all task orders are completed on-time, within budget and that a quality product is delivered as defined in the quality control section of this document. Changes of project manager resource after selection must be approved by the Task Order Manager.

### **7.2 Aerial Imagery Collection, Processing and Delivery**

Due to Homeland Security issues and the number of military installations and other security sensitive locations within the State of Alabama, this RFP requires that all work conducted for a project is performed within the boundaries of the United States. Under no circumstances shall it be permitted to send any maps or any other data, whether digital or hard copy, associated with the performance of a contract to destinations outside of this country. The use of offshore labor or

non US citizens in performance of any aspect of a project or work performed in the United States by a company that in any way is owned or partly owned or managed by a non-United States Citizen must be considered on a case-by-case basis and advance approval requested from the Task Order Manager.

It is preferred to have all work performed by the contracting vendor; however, it will not be the sole criterion for selection. Where a vendor proposes a subcontracting arrangement, the submitted proposal must address how quality and workmanship will be maintained and should demonstrate the knowledge, expertise, capacity and oversight to insure a successful project. Advance approval must be requested from the Task Order Manger for any proposed subcontracted or outsourced project implementation, digital imagery, photography, and processing or photogrammetric work. The Task Order Manager requires a set of pilot test maps to be checked for accuracy which will be inspected and evaluated.

### 7.2.1 Project Coordinate System

The horizontal control shall be tied to the Alabama State Plane Coordinate System, North American Datum 1983 (NAD83) (2011), U. S. Survey Feet. The vertical control shall be tied to the North American Vertical Datum 1988 (NAVD88) (using the latest Geoid model available from the National Geodetic Survey), U.S. Survey Feet. The ellipsoid shall be GRS 80.

### 7.2.2 Airborne GPS/Inertial Measurement Unit (IMU)

The Vendor’s will provide sufficient horizontal and vertical control to support the airborne GPS/IMU and aero-triangulation solution. Flight plans shall indicate the locations of all control points to be collected. The use of IMU is optional. An A/T report will be available to provide statistical validation for the triangulation and/or IMU solution used in the production process.

### 7.2.3 Accuracy Standards

All products produced for this project shall meet or exceed the ASPRS Class I Accuracy Standards for 1”=200’ maps unless otherwise specified by the State. The table below interprets that requirement in terms of RMSE (Root Mean Square Error), CE90 (Circular Error at the 90% Confidence Level), RMSE<sub>r</sub> (Square Root of RMSE<sub>x</sub> + RMSE<sub>y</sub>) and Accuracy (horizontal radial accuracy at 95% Confidence Level). The vendor will adhere to the latest ASPRS standards ([http://www.asprs.org/wp-content/uploads/2015/01/ASPRS Positional Accuracy Standards Edition1 Version100 November2014.pdf](http://www.asprs.org/wp-content/uploads/2015/01/ASPRS_Positional_Accuracy_Standards_Edition1_Version100_November2014.pdf)).

Map Scale	RMSE <sub>xy</sub>	CE90	RMSE <sub>r</sub>	Accuracy <sub>r</sub>
1”=200’	2.000’	4.292’	2.828’	4.895’

### 7.2.4 Buy-Up Accuracy Standards

A local jurisdiction that has elected to “buy-up” to an improved accuracy will require an improved level of accuracy to be obtained for its localized adjustment.



Map Scale	RMSE <sub>xy</sub>	CE90	RMSE <sub>r</sub>	Accuracy <sub>r</sub>
1"=100'	1.000'	2.146'	1.414'	2.448'

The Task Order Contractor's QA/QC team shall perform a quantitative analysis of the data and shall report the final RMSEr and Accuracy errors. An independent evaluation of the results may also be performed by the State.

### 7.2.5 Ground Control

Vendors shall propose their approach for controlling the orthophotography including how, if applicable, existing control will be included. Each vendor should outline the number of control points required and should show on the flight plan map the preliminary locations of the required control points. The vendor shall be responsible for establishing ground control of sufficient density and accuracy to meet accuracy requirements of the deliverable orthophotography at the resolutions required. Existing control will be made available.

The State's assumption is that the existing control will comprise the majority of the required control and minimal new control will be needed.

The control report shall contain the following items:

- Number of control points surveyed and corresponding coordinates, elevation, point description, and datums used
- Description of the procedures followed and equipment used
- Accuracy standard for the control
- Surveyor in Charge with license certification

The report shall be provided in PDF format and the control data shall be provided in shapefile format. Any new ground control established for this project must be tied to the Alabama State Plane Coordinate System, NAVD 88 (using the latest Geoid model available from the National Geodetic Survey) and must be established by a licensed surveyor in the State of Alabama. All ground control points must be documented as such so that they are easily relocated by other surveyors throughout the duration of the project.

### 7.2.6 Aerial Camera

The Vendor is required to use a large format area or linear array based digital sensor designed specifically for large-scale photogrammetric mapping. Digital sensors proposed shall be recognized by the USGS as capable of providing image data to support civil government mapping and orthophotography product development.

[http://calval.cr.usgs.gov/manufacturers\\_certification.php](http://calval.cr.usgs.gov/manufacturers_certification.php)

Camera calibration reports for the specific sensors proposed for this project shall be provided as a digital file(s) with each respondent's proposal.

The camera must capture simultaneous multi-spectral (RGB and NIR) information. The camera shall utilize Forward Motion Compensation and Airborne GPS/INS system and must also be properly installed on a Gyro-Stabilized Mount.

The digital aerial images shall be clear and sharp in detail and of high radiometric quality. The camera shall capture the images in an uncompressed “lossless” image format. The images shall also be free from image blurs, image artifacts, “cold” or “hot” pixels, color distortion, color balance or tonal problems, or any other type of digital blemish.

If multiple sensor platforms are proposed it must be specifically detailed and advantages associated with a multi-sensor approach should be described. For those cameras that now have multiple versions in the marketplace, it is required that compatible sensors be utilized for the entire mission to ensure that all interim and final products are the same and meet the requirements outlined herein. If a Vendor proposes multiple generations of the same sensor, the Vendor shall clearly address compatibility issues and how those will be overcome in its technical production processes. This is especially true if subsequent iterations allow for a higher flying height or larger image footprint.

### **7.2.7 Flight Specifications**

The flying height for this project should be chosen in accordance with the camera manufacturer’s recommended flying height to produce digital orthophotography to the accuracy standards noted previously. Vendor’s proposal must contain a flight plan map with the chosen altitude for flight clearly labeled. The flight plan map should also, at a minimum, include the number of flight lines, number of exposures and number of flight line miles.

Vendor shall clearly state its compliance with these items. The following additional specifications are non-negotiable:

### **7.2.8 Re-Flights**

Vendor must correct at no additional fee aerial imagery that does not meet defined specifications. All re-flights must be centered on the plotted flight lines and must be taken with the same camera system. If for any reason the Vendor fails to acquire the entire area, re-flights are required to complete full counties. Partial county deliverables split between multiple acquisition seasons is not acceptable.

### **7.2.9 Flights Restrictions**

Vendor shall be responsible for obtaining all permits which may be required in the performance of this work, which shall include, but not be limited to any permits for acquisition of data in controlled or restricted airspace, and access to control points on the ground.

### **7.2.10 Optional Near True Ortho and/or Increased Accuracy Resolution Buy-ups**

Some local jurisdictions have business requirements that necessitate the acquisition of near true orthophoto imagery in specifically identified portions of their locality. Several counties may also consider countywide acquisition of near true orthos to support in-house updates of planimetric features (specifically buildings and roads). For each of these project options, Task Order

Contractor will be required to adjust the forward overlap from 60% to 80% (not applicable for linear array based digital sensors) and to adjust the sidelap from 30% to 60%. However, each agency may elect for additional “spot shots” or mini-strips to be taken over buildings that have traditionally yielded less than desirable results using the adjusted forward overlap and sidelap approach. Alternative methods of producing near true orthos (such as building modeling) will also be considered.

### **7.2.11 Aircraft Commitments**

The state requires that this project be executed with multiple sensors dedicated to aerial photography acquisition. Each Vendor should clearly state its plan for acquisition to ensure the following objectives are met:

1. All aerial photography is secured within the requirements outlined in the Task Order.
2. All aerial photography is secured within a single flight season.
3. A **minimum** of 4 aircraft are committed to be on-site at the beginning of the flying season.

Aircraft information (tail number) data shall be provided prior to initiating flying so that the State can confirm and monitor aircraft assets using software such as Flight Aware or equivalent. Vendors should be aware of potential flight restrictions in and around the State.

### **7.2.12 Image Post-Processing**

Image post-processing shall be performed in accordance with manufacturer’s specifications. The Task Order Contractor will be required to provide samples to the State for review prior to processing each production block. The State will review the samples and make recommendations on any changes, if necessary. Once the changes have been made, the samples will be re-submitted for approval. The approved samples shall provide a baseline for post-processing the remaining imagery.

The final processed RGB and NIR TIFF Images are required deliverables to the State. The Task Order Contractor is required to deliver this data on a hard drive(s) that will become the property of the State.

Georeferencing information for the processed (unrectified) imagery (tfw files) shall be provided (in U.S. feet only).

A QA/QC report verifying the Task Order Contractor Imagery QC process for the imagery shall be provided with each processed image delivery.

Imagery will be reviewed by the State and/or its independent QA/QC contractor. The Task Order Contractor will not be authorized to begin digital orthophoto production until the post-processed images have been thoroughly catalogued, reviewed and approved by the State.

### **7.2.13 Aerial Triangulation (AT)**

Aerial triangulation must be used to densify the control solution. Direct geo-referencing is not allowed as a substitute for a fully adjusted AT solution. The Task Order Contractor must detail its procedures for performing aerial triangulation including the QA/QC steps employed during this process.

It is recognized that AT blocks will not correspond to counties. The Task Order Contractor as part of the Project Work plan shall identify AT blocks to be established and the criteria for their establishment.

The final aerial triangulation report and digital solution will be delivered to the State for thorough review and analysis. The State will work with the Task Order Contractor to define a consistent format for the deliverable AT solutions.

The State and/or its independent QA/QC contractor will review the AT reports that are submitted by the Task Order Contractor and certify that the results support the accuracy standards that are specified. The AT reports shall be signed by a Certified Photogrammetrist ensuring compliance.

### **7.2.14 Digital Elevation Model (DEM)**

The State will provide LIDAR bare earth data to be used for orthorectification where available. A countywide DTM/DEM shall be generated based upon terrain data extracted from the aerial photography if no LiDAR is available. If digital imagery is used the applicable image scale and AGL will be based upon the vertical accuracy achievable by the respective sensor. Depending on the type of sensor a lower AGL may be required to support the vertical accuracy than required for horizontal only accuracy. The contractor will include in the proposal the planned Image scale, Above Ground Level height, sensor pixel Ground Distance Resolution and the expected horizontal and vertical accuracy of the perspective image center at time of collection of digital imagery to support county requirements for GIS Planimetric Mapping with Orthophotography or GIS Topographic Mapping with Orthophotography.

The Ortho DEM used for this project will be a deliverable. Although other options will be considered for DEM development (e.g., use of propriety DEMs, recompilation, new LIDAR), it is our intent that the existing LIDAR be used as the primary source for orthorectification. Any break line data produced must also be provided as part of the DEM deliverable.

The state does expect that some spot updates may be necessary to support orthophoto production. It is expected that any surface updates will be made only to the requirements necessary to support the orthorectification process. The State does not require the updates be consistent with that of a DTM capable of supporting contour modeling or other engineering applications.

### **7.2.15 Digital Orthophotography**

This Section describes the specifications for the production of the digital orthophotography. Task Order Proposals shall clearly state and explain the compliance, or non-compliance with these requirements.

Tiles will be provided using a 5000' by 5000' tile layout, unless otherwise specified by the State. The previous tile grid has been provided as part of this proposal and should be used again. Note this tile layout reflects the overall grid and not the mapping limits.

Tiles with no data areas are not acceptable.

#### **4-Band Resultant Imagery**

The primary product requested by the State is a statewide set of 4-band digital orthophotos with a 1.0' ground pixel resolution. All digital orthophotography shall be produced in accordance with the accuracy requirements outlined herewith in. All buy-ups for a 0.25' and 0.50' ground pixel resolution are also required to be a stacked 4-band product.

All image products are required to be 100% compliant with the size, position and naming conventions of the tiling schema that is developed for this project.

The State requires that the spatial reference for each GeoTIFF be established to allow for easy re-projection in ArcGIS.

#### **Compressed Imagery**

Once the tiled image products have been accepted, the Task Order Contractor will be required to produce a complete set of 3 band MrSID and 4 band JPEG files for each tile. Georeferencing files shall be provided in meters and feet for each of these deliverables. Compressed tiled data shall be produced at a 20:1 ratio unless otherwise authorized.

Countywide image mosaics shall also be produced in MrSID and ECW formats. These mosaics shall be produced at a 25:1 ratio. It is expected that a single file will be produced for each County however some Counties may elect to have their mosaics divided into 2 or 4 quadrants. Mosaic requirements will be finalized after the pilot project is complete.

### **7.2.16 Metadata and Reports**

Metadata compliant with the Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata is required in extensible markup language (.xml) format.

Metadata should be created on a project level for each product, including the imagery, flight data, AT, DEM and other databases used and delivered to the State. The state does not require tile level metadata to be developed.

Production of *full* FGDC compliant metadata following the USGS FGDC aerial photography metadata example here <http://earthexplorer.usgs.gov/fgdc/4660/AR1131860010276/> is required.

Details and tools for building FGDC metadata can be found on the site <http://www.fgdc.gov/metadata/geospatial-metadata-tools>.

Metadata may also be supplemented with projects reports where the report conveys additional information not suitable for metadata.

### **7.2.17 Media and Data Ownership**

All products will be delivered on external hard drives and will become the property of the State. All media and data collected under this contract shall be the sole property and can be freely

distributed by the State and its Federal and local government partners. All the delivered data is also to be unlicensed, and releasable to the public without cost or use restrictions. Until final products are received and accepted the Task Order Contractor shall not sell or distribute any data produced as part of this project without approval from the State.

Media labeling shall include:

- Project Name
- Date of Delivery
- Product Delivered (imagery, DEM, etc.)
- File format

### **7.2.18 Technical Assistance**

As part of the fixed price proposal, the Task Order Contractor shall be prepared to provide up to 150 hours of ad-hoc technical assistance for Orthoimagery and Related Products (Attachment 1). The Task Order Contractor shall be prepared to provide up to 150 hours annually of ad-hoc technical assistance. This will be performed on a task order basis for specifically defined tasks related to this project. It can be used for supplemental data production or processing activities and/or activities related to integration/loading of data into the Virtual Alabama, specialized mosaics, additional hard drive distribution. It may also be used for other technical assistance tasks at the State's discretion. The Task Order Contractor and the State will mutually agree on the tasks to be performed and the level of effort associated with each task.

### **7.2.19 Forward Overlap**

The forward overlap applied should be 60% (+/- 3% allowance for deviation). In the case of linear array scanners, this requirement does not exist. In those areas designated for Near True Orthos, the Vendor must increase the forward overlap from 60% to 80%.

### **7.2.20 Sidelap**

Sidelap will not be less than thirty (30) percent between parallel flight lines. Any point on any flight line will not deviate from its flight plan location by more than 10% of the width of coverage of the photograph/image. Sidelap error will average less than 5% for optimal coverage. For Near True Orthos the Vendor must increase the sidelap from 30% to 60%.

### **7.2.21 Environmental Conditions**

Aerial imagery should be obtained when the sky is clear (cloud cover will not be tolerated); the ground is free from snow, haze, smoke, dust, and cloud shadows; and deciduous trees are sufficiently barren to permit the intended uses of the imagery. Spectral reflectance from water should be minimized and should not obscure shoreline features. The solar angle must be 30-degrees or more above the horizon at the time of exposure.

### **7.2.22 Crab**

Crab must 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 must be acquired to replace rejected photographs or flight lines. Crab in excess of three (3) degrees may be cause for rejection of a flight line or any portion thereof in which the excess crab occurs.

### **7.2.23 Bridges and Overpasses**

All bridges must be free of distortion and must be corrected to their true position in the final digital orthophoto products. To accommodate this, each Vendor can prescribe their own methodology that could include spot shots, breaklines on bridges, photo correction using photo enhancement software or some combination thereof.

### **7.2.24 Tilt**

Tilt of the camera from verticality at the instant of each exposure shall not exceed 3 degrees nor shall it exceed 5 degrees between successive exposure stations. Average tilt over the entire project shall not exceed one (1) degree.

### **7.2.25 Drift**

Changes in course between successive photographs/images will not exceed 3 degrees.

### **7.2.26 Aircraft**

The aircraft to be used shall be configured and equipped for aerial photography/imagery purposes with all essential navigational and photographic/sensor instruments and will be operated by a well-trained and experienced crew. Performance of the aircraft shall be adequate to complete the proposed project in accordance with the technical specifications. All operations shall be in conformity with the applicable official regulations and ordinances.

### **7.2.27 Quality Control**

The State requires each Vendor to provide a process workflow of its approach to QA/QC. Of specific interest is when each QA/QC step occurs in the production process. In addition to the process map, each Vendor should discuss its procedures with the Task Order Manager to ensure data conformance to the requirements outlined herewith in.

The State's desire is to develop a program to maintain imagery for the State of Alabama, and to have an independent QA/QC process built into this program. The State reserves the right to award a separate contract for independent QA/QC services in addition to those in addition to those provided by the Task Order Contractor as part of this Task Order Contract. The State and its partners also will establish an internal QC team and will provide an opportunity for its local partners to review the data products provided.

The State requires development of a web based QA/QC tool that will allow each locality to review data for its jurisdiction as part of the process without multiple copies of the imagery needing to be distributed to its partners. These tools should enable the QA/QC reporting to be performed in a consistent manner across jurisdictions. Delivery of fixed media products will not occur until after the web based QC is complete by the State/local stakeholders. The Task Order Contactor will be responsible for creating the map services necessary to support the imagery review process.

### **7.2.28 One Pass QA/QC**

In an effort to streamline the quality review and acceptance process, a “One-Pass” review cycle applies to this project. This review cycle is designed to alleviate the production bottleneck that can be caused with iterative cycles of product rejection to resolve minor discrepancies in the digital orthophotography.

The work flow process for the One Pass Review Cycle is as follows:

1. The State and its QA/QC team will perform a comprehensive quality evaluation of the initial data delivery from the Task Order Contractor. This evaluation will identify all failures, discrepancies and systematic errors as defined by the acceptance criteria.
2. The State and its QA/QC team will utilize the online QC application to perform the data assessment. The result is a single database containing pre-defined error calls that will be submitted to the Task Order Contractor for correction. All valid edit calls will be fixed. The state has the final authority as to whether or not a feature shall be corrected.
3. It is expected that the Task Order Contractor will examine each One Pass discrepancy(ies) and indicate in the database the action taken regardless of the overall % of acceptance for the data. If there are discrepancies, those will need to be reviewed by the State, Task Order Contractor and county representative one at a time to reach consensus. Simply marking the database with numerous calls stating “Not an Error” or something similar will not be acceptable to the State.
4. The State and its QA/QC team will perform a second review validating that the original edit calls were addressed and that no new errors have been introduced during this process.

The web based QC application shall contain at a minimum the following functionality:

- Ability to pan, zoom, navigate to tiles or areas of interest
- Ability to mark edit calls for areas or points using menu based tool for standardized error reporting
- Ability to include key reference features (e.g., seam lines, tile numbers, centerlines, tile layout) for orientation purposes
- Ability to track status or feedback regarding the user defined calls (e.g., fixed, not fixed, invalid edit)
- Ability to display RGB and NIR imagery
- Provide access through login/password accounts and shall allow multiple users to use the same account simultaneously.

The benefits to this process is the knowledge that there will be one comprehensive review of the data and the secondary (and beyond) reviews will only be to validate that errors have been corrected properly. The one-pass review process will include comments from the respective counties that are involved in this project.

### **7.2.29 BACKUP / DISASTER RECOVERY**

The Task Order Contractor shall be responsible for assuring that all data is retained and available for processing up to and including delivery and acceptance testing. This may include performing backups of the raw, pre-processed and delivery imagery on a regular basis. Backups may be retained at the Task Order Contractors discretion once the final product has been accepted in



writing by the State. The Contractor shall maintain on-site storage for a backup set of final imagery products for a 5 year period commencing after final acceptance.

### **7.2.30 HARDWARE, SOFTWARE, AND MATERIALS**

The Task Order Contractor is responsible for providing all hardware, software and materials at its own expense necessary to meet the deliverables and schedule identified in this Scope of Work.

## **8.0 DELIVERABLES**

### **8.1.1 DELIVERABLE SUBMISSION PROCESS**

Written deliverables defined as draft documents must demonstrate due diligence in meeting the scope and requirements of the associated final written deliverable. A draft written deliverable may contain limited structural errors such as poor grammar, misspellings or incorrect punctuation, but must:

- Be presented in a format appropriate for the subject matter and depth of discussion.
- Be organized in a manner that presents a logical flow of the deliverable's content.
- Present information that is relevant to the Section of the deliverable being discussed.
- Represent a significant level of completeness towards the associated final written deliverable that supports a concise final deliverable acceptance process.

Upon completion of a deliverable, the Task Order Contractor shall document each deliverable in final form and submit to the Task Order Manager for acceptance.

Upon receipt of a final deliverable, the Task Order Manager shall commence a review of the deliverable as required to validate the completeness and quality in meeting requirements. Upon completion of validation, the Task Order Manager shall issue to the Task Order Contractor notice of acceptance or rejection of the deliverables in an Agency Acceptance of Deliverable Form (Attachment \_\_\_\_). In the event of rejection, the Task Order Contractor shall correct the identified deficiencies or non-conformities. Subsequent project tasks may not continue until deficiencies with a deliverable are rectified and accepted by the Task Order Manager or the Task Order Manager has specifically issued, in writing, a waiver for conditional continuance of project tasks. Once the State's issues have been addressed and resolutions are accepted by the Task Order Manager, the Task Order Contractor will incorporate the resolutions into the deliverable and resubmit the deliverable for acceptance. Accepted deliverables shall be invoiced as provided in Section \_\_\_\_\_ hereof.

A written deliverable defined as a final document must satisfy the scope and requirements of this document for that deliverable. Final written deliverables shall not contain structural errors such as poor grammar, misspellings or incorrect punctuation, and must:

- A) Be presented in a format appropriate for the subject matter and depth of discussion.
- B) Be organized in a manner that presents a logical flow of the deliverable's content.
- C) Represent factual information reasonably expected to have been known at the time of submittal.
- D) Present information that is relevant to the Section of the deliverable being discussed.

The State required deliverables are defined below. Within each task, the Task Order Contractor may suggest other subtasks or deliverables to improve the quality and success of the project.

Project deliverable milestones for the purpose of invoicing:

- Mobilization complete
- Imagery acquisition complete
- Aerial triangulation complete
- Pilot complete
- Production complete
- Final deliverables submitted

### **8.1.2 DELIVERABLE DESCRIPTIONS / ACCEPTANCE CRITERIA**

All deliverables will undergo a detailed review and acceptance testing process prior to acceptance. A complete list of deliverable is described within the document and included as a summary below.

Time frames for deliverables should be proposed by Vendors in their Technical Proposals (See Section listing the deliverables below). Agencies should set overall expected time frames for completing all deliverables, e.g., “within 18 months,” but should allow schedule flexibility for individual deliverables.

#### **Project Management Deliverables**

- Project Work plan
- Project Meetings and Status reporting
- Project management website using SharePoint or Comparable tools
- QA/QC web mapping application

#### **Ground Control Deliverables**

- Shapefile of Ground Control used
- Ground Control report in Word and PDF file format

#### **Aerial Photography Deliverables**

- Planned Photo Centers in Shapefile format with attributes including corresponding line and frame (or line scanner equivalent) number
- As Flown Photo Centers in Shapefile format with attributes including corresponding line and frame number that correlates to the final post-processed TIFF Images. It must also include an attribute for the date of photography, and a time stamp for acquisition to be used to verify the correct sun angle.
- Aerial Photography Mission Logs
- Final Processed TIFF Images on an external Hard Drive that will not be returned. The imagery will be georeferenced with the processed airborne GPS information.
- Final processed Airborne GPS and IMU Orientation Data

**Aerial Triangulation Deliverables**

- AT solution delivered in a format usable by other vendors for planimetric mapping purposes; and
- Copies of a final aerial triangulation report in PDF and Word format with associated data files as excel tables.

**DEM Deliverables**

- DEM file used for orthorectification – by County in ArcGIS format as geodatabase

**Orthophotography Deliverables**

- One (1) set of countywide statewide 4-band 1”=200’ digital orthophotos with a 1.0’ ground pixel resolution in GeoTIFF format.
- One (1) set of statewide 3-band (color RGB) 1”=200’ digital orthophotos with a 1.0’ ground pixel resolution in MrSID format – 1:20 compression
- One (1) complete set of statewide 4-band (color RGB) 1”=200’ digital orthophotos with a 1.0’ ground pixel resolution in JPEG2000 format – 1:20 compression
- One County-based 3-band (color RGB) 1”=200’ digital orthophotos with a 1.0’ ground pixel resolution in MrSID format – 1:25 compression
- One County-based 3-band (color RGB) 1”=200’ digital orthophotos with a 1.0’ ground pixel resolution in ECW format – 1:25 compression
- One (1) FGDC-Compliant Metadata record for each image set produced
- One (1) FGDC-Compliant Metadata record for each data set produced

**8.1.3 Quality Assurance Inspection of the Deliverables**

This section provides the acceptance criteria that will be used to evaluate the final products produced for this program. These criteria will be finalized in consultation with the Task Order Contractor as part of the project initiation phase as identified in 8.2.4.

Tested Characteristic		Measure of Acceptability
Inventory / Spatial Domain / Metadata Criteria		
1.	Media: External Hard Drive	Media is readable, all files accessible, no files corrupted
2.	Media label	Conforms to Alabama specifications. Section _____
3.	File organization	Files written in tile sheet order
4.	File name	Conforms to required state tiling index nomenclature – Section 2.14-
5.	GeoTIFF & .tfw format	File reads in ArcGIS, ArcMap, etc.
6.	Geographic Coverage Assessment	Verify extents of GeoTIFF header and tfw file against tile index to ensure no overlap of tiles.
7.	Pixel definition	GeoTIFF reference will be the upper left corner of the upper left-most pixel World file must reference the center of the pixel located in the upper left hand corner of the tile as the point of origin.
8.	Georeferencing	World file has correct coordinates expressed to at least 2 significant digits, and correct pixel size and pixel count
9.	Datum	Alabama State Plane Coordinate System, NAD 83 (2011) Adjustment

10.	Units	U.S. Survey Feet
11.	32 bit (8 per channel) 4 band stacked image	256 levels of value for each band, 0=black, 255=white
12.	Ground Resolution	1.0 Foot, (0.5', or 0.25' for buy-up)
13.	Sheet size	Tiles conform to tile grid
14.	Image Compression	Check GeoTIFF header for evidence of image compression (JPEG Compression, Overviews, Tiling, etc...)
15.	Metadata	Conforms to FGDC Metadata Standard- Should run through the USGS Meta Parser tool without error.
<b>Visual Inspection Criteria</b>		
16.	Horizontal Displacement / Mis-Alignment	Horizontal displacement along an apparent seam line or along a tile boundary must be equal to or less than 2 pixels on well-defined ground features (roads, sidewalks, curbs).
17.	Tonal quality	Check entire block for tonal balancing across and between delivery blocks as well as between deliverables with differing resolutions.
18.	Image blemishes and artifacts	<p>Generally acceptable within these limits:  If 1 pixel wide, 100 pixels in length.  If 2 pixels wide, 60 pixels in length.  If 3 pixels wide, 20 pixels in length.  If 4 - 12 pixels wide, 12 pixels in length.</p> <p>Artifacts exceeding these limits may be acceptable if ground feature detail is not obscured, or if the brightness value of the pixels in the artifact is fewer than 170.</p> <p>Artifacts within these limits may be rejected if critical ground features are significantly impacted. Critical features shall be defined as features having County, State or National significance (i.e., Courthouses, Capitol Buildings, etc.).</p> <p>Clusters of artifacts that do not individually meet these criteria may be considered unacceptable if more than 12 are visible within a viewing screen at 1:1 zoom (5 or more artifacts within a 200 pixel area preferred).</p>
19.	Image Appearance /Smears	Image contains no extreme color, tone, or contrast variations from approved sample. Smears corrected by adding mass points or break lines to DEM as necessary to

20.	Wavy features	99% of distinct linear ground features (such as road markings, and curbs) shall be positionally correct and should not deviate from their apparent path by more than 5 pixels measured perpendicular to the feature within any 100 pixel distance measured along the feature length. On roads, measurements should be taken from centerline of road instead of road edges, shoulder and railings.
21.	Mosaic lines	Mosaic lines through buildings and above ground transportation structures shall be avoided through the greatest extent practical. Mosaic line placement should not result in artificial clipping of features along tile boundaries or missing photo areas anywhere within the project area. As with buildings, other minor elevation structures such as pipelines, private footbridges or boardwalks, are not rectified as elevated roadways are. Distortion of these features is not grounds for rejection of the imagery. Seam lines should not be visible at the viewing scale for which the imagery is produced. Typically they should not be visible at 1.5 times the map scale. Because seam lines are run around buildings and other structures, the orientation of shadows associated with trees, poles, and buildings may fall in different directions on the imagery, or may in some cases result in multiple shadows for a feature. Seam lines will not be edited to reflect shadow orientation.

### Orthophoto Horizontal Accuracy Criteria

<b>1"=200'-scale (Standard Product)</b>		
29.	RMSE of known ground points measured on the image <i>See ASPRS Class I Standards Page 8, Table 16, and NSSDA Part 3, Appendices 3-A and 3-D for explanation of formulas.</i>	$RMSE_x = RMSE_y = 2.000'$ and $RMSE_r = 2.828'$
30.	Absolute accuracy. Accuracy <sub>r</sub> = horizontal (radial) accuracy at 95% confidence level = $RMSE_r \times 1.7308$	NSSDA accuracy (20+ points) such that 95% of the points tested shall meet the criteria of $\leq 5.00'$
31.	Mismatch of features along mosaic lines and production block boundaries of equal scale	Equal to or less than 2 pixels at 95 % on well-defined features (roads, sidewalk curbs) for mosaic lines

<b>1"=100' (Buy-Up Resolution to 6" and Accuracy)</b>		
32.	Ground resolution	0.50' US Survey Feet
33.	RMSE of known ground points measured on the image <i>See ASPRS Class I Standards Page 8, Table 16, and NSSDA Part 3, Appendices 3-A and 3-D for explanation of formulas.</i>	$RMSE_x = RMSE_y = 1.000'$ and $RMSE_r = 1.414'$

34.	Absolute accuracy. Accuracy <sub>r</sub> = horizontal (radial) accuracy at 95% confidence level = RMSE <sub>r</sub> x 1.7308	NSSDA accuracy (20+ points) such that 95% of the points tested shall meet the criteria of ≤2.50'
35.	Mismatch of features along mosaic lines and production block boundaries of equal scale	Equal to or less than 2 pixels at 95 % on well-defined features (roads, sidewalk curbs) for mosaic lines

### Digital Elevation Model QA Acceptance Criteria

Tested Characteristic		Measure of Acceptability
36.	File organization	ESRI File Geodatabase for the entire delivery area
37.	File name	Conforms to required convention
38.	Format	ESRI File Geodatabase, all features have x, y, z values
39.	Breaklines & mass point locations	Sufficient to accurately build elevation to support ortho
41.	Continuity	No spikes or holes, no gaps of sufficient size to affect orthorectification, regardless of perspective center.
42.	Attributes	Conform to DEM standard

### Aerial Triangulation Acceptance Criteria

1"=200' (Standard Product)		
Tested Characteristic All Scales		Measure of Acceptability
43.	Report Format	Conforms to required convention (to be determined with the State in pilot phase). Each block of triangulation shall have a separate report.
44.	Report Completeness	All information complete and readable

45.	Precision of Image Observations	Sigma (0) less than or equal to 5 microns is acceptable.
46.	Horizontal accuracy against ground control check points tested in accordance with 10+ points at NSSDA criteria	RMSE values are acceptable up to 1/9,000' for individual AT blocks in the X and Y direction. Higher RMSE values are subject to review.
47.	Vertical accuracy against ground control check points tested in accordance with 10+ points at NSSDA criteria	RMSE values are acceptable up to 1/7,500 of flying height for the 200 scale AT blocks. Higher RMSE values are subject to review.
48.	Accuracy against image coordinates	RMSE less than or equal to 5 microns is acceptable.
49.	Max. offsets [E, N] to any one blind QA point	3 * RMSE for that scale
50.	NSSDA analysis [E, N] of 40 QA points	95% within 1.73 * RMSE for that scale

1"=100' (Buy-Up Resolution to 6" and Accuracy)		
Tested Characteristic All Scales		Measure of Acceptability
59.	Report Format	Conforms to required convention (to be determined with the State in pilot phase). Each block of triangulation shall have a separate report.
60.	Report Completeness	All information complete and readable
61.	Precision of Image Observations	Sigma (0) less than or equal to 5 microns is acceptable.

62.	Horizontal accuracy against ground control check points tested in accordance with 10+ points at NSSDA criteria	RMSE values are acceptable up to 1/10,000' for individual AT blocks in the X and Y direction. Higher RMSE values are subject to review.
63.	Vertical accuracy against ground control check points tested in accordance with 10+ points at NSSDA criteria	RMSE values are acceptable up to 1/9,000 of flying height for the 100 scale AT blocks. Higher RMSE values are subject to review.
64.	Accuracy against image coordinates	RMSE less than or equal to 5 microns is acceptable.
65.	Max. offsets [E, N] to any one blind QA point	3 * RMSE for that scale
66.	NSSDA analysis [E, N] of 40 QA points	95% within 1.73 * RMSE for that scale

### **8.1.4 OPTIONAL PRODUCTS**

The State has an interest in receiving technical and cost proposal information for various optional products. There is no commitment to procure any of these optional products and the costs for the optional products will not be included as part of the evaluation process. The costs and methodology described can be used as a basis to negotiate a scope of work (for these supplemental services) under this contract. The State (or the respective counties) also reserves the right to negotiate a scope of work with a firm other than the selected orthoimagery vendor for any or all of the optional services. All of the options will require a startup and design/work plan phase, a pilot project, production work, independent QA/QC, and one-pass stakeholder QC prior to final product delivery.

### **8.1.5 Oblique Imagery (Optional)**

The State has an interest in receiving and technical and cost proposal information for oblique imagery solutions. Although the acquisition of oblique imagery is not planned at this time, the State and its partnering local government agencies may be interested in procuring oblique imagery as an additional (secondary) value added product. Oblique imagery would be acquired with a digital camera system optimized for acquisition and processing of oblique imagery. It is assumed this would be a separate flight and camera system than what is used for the orthophotography. Oblique imagery would be acquired in leaf off conditions (spring or fall) on a city or County-wide basis. Pricing options for 4", 6", and 12" oblique imagery solutions should be provided. Options may also be presented for licensed and unlicensed products. Oblique imagery procured under this contract vehicle could be procured by the State or may be contracted directly by one or more of the local government agencies throughout the State.

### **8.1.6 LiDAR (Optional)**

The State has an interest in receiving an optional cost to acquire LiDAR data. It is assumed any new LIDAR would be acquired in accordance with the USGS LIDAR specifications and would involve a minimal collection area of an entire County at one time.

<http://pubs.usgs.gov/tm/11b4/TM11-B4.pdf>

USGS will be flying 12 Counties in the Fall of 2016 to the quality level 2 standards. It is anticipated that future Countywide LIDAR would be flown to this standard as well. Pricing information is also requested for the additional higher density data (Quality Level 1) and lower density /accuracy data (Quality Level 3) data.

Table 1. Quality Levels for LiDAR Horizontal Resolution and Vertical Accuracy					
Elevation Quality Levels (QL)	Source	Horizontal Resolution Terms		Vertical Accuracy Terms	
		Point Density	Nominal Pulse Spacing (NPS)	Vertical RMSEz	Equivalent Contour Accuracy
QL 1	LiDAR	8 pts/m <sup>2</sup>	0.35 m	9.25 cm	1-ft
QL 2	LiDAR	2 pts/m <sup>2</sup>	0.7 m	9.25 cm	1-ft
QL 3	LiDAR	1 – 0.25 pts/m <sup>2</sup>	1 – 2 m	≤18.5 cm	2-ft

It is assumed that any new LiDAR would be flown in leaf off conditions. It is also assumed the contractor would review and finalize the work plan for LIDAR collection and processing for each county to be collected and the final deliverable products would be produced on a countywide basis. Independent QA/QC should be performed on the LIDAR data acquired (the QA/QC Is not to be performed by the contractor that acquired and processed the data) and the QC contractor must certify in writing that it has reviewed the data for compliance with USGS specifications. No tide coordination is required although that may be a separate add-on that is included in the final negotiated contract.

### 8.1.7 County based Planimetric Data (Optional)

The State has an interest in receiving an optional cost to update or produce new planimetric features. All counties in the State have some planimetric features available. Most of the existing planimetric data was produced at either 100’ scale or 200’ scale from photogrammetric techniques. Some Counties have performed regular updates since the data was initially compiled. Others have performed selective updates based on digitizing from orthoimagery. There is no detailed inventory of planimetric data that is available. Each of the Counties also has a unique database design. It is assumed updates or new mapping would be done on a countywide basis. It is also assumed that any planimetric mapping project would involve development of a detailed project workplan and database design, completion of a pilot project, delivery of data in geodatabase format, and independent QA/QC services.

The Level 1 features below represent the primary impervious surface features and the Level 2 features represent secondary impervious surface features as well as some additional major reference features. Although the assumption is these features would be compiled (or updated) photogrammetrically the State is also interested in semi-automated feature extraction approaches. Vendors may propose an alternative approach based on semi-automated feature extraction techniques in addition to the more standard photogrammetric approach to generate this data. tizing from orthoimagery.

Level 1 Planimetric Features	<ul style="list-style-type: none"> <li>Paved Road Polygons</li> <li>Unpaved Road Polygons</li> <li>Alleys</li> <li>Buildings (over 100 square feet)</li> <li>Major Paved Parking Areas (Over 10 spaces)</li> <li>Major Unpaved Parking Areas (Over 10 spaces)</li> </ul>
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Level 2 Planimetric Features	Driveways Sidewalks (public – not private walkways to residences) Minor Paved Parking Areas Paved unpaved Parking Areas Other Paved surfaces over 200 square feet Hydrography (lakes, ponds, reservoirs, streams, rivers, stormwater drainage ponds) Major Transmission Towers Cross Country Transmission Lines
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Depending on the final project requirements additional features may be included from the list, or features may be excluded.

Ideally any data that is over 6 years old would be replaced instead of updated.

### **8.1.8 Land Use / Land Cover Option**

There are two primary options under consideration for completing the land use updates. The first involves performing an update of the existing data using the latest NAIP imagery. The second is to perform a more comprehensive remap based on the latest 1.0’ resolution imagery. Both approaches shall involve delivery of ArcGIS polygon based data using the current classification scheme.

Irrespective of the approach, production shall start with a preliminary analysis of a small Test Area, to establish rules use of source data. Once these rules are established, they shall be applied to two larger Pilot Areas covering about 10 square miles each and a variety of land use types. The approach to be used could involve manual interpretation of semi-automated procedures. Fully automated approaches are not expected to be acceptable.

#### **High resolution LU/LC map using new imagery**

This option could include a manual or semi-automated interpretation of Land Use / Land Cover using the existing classification scheme. Under this approach the minimum mapping unit would be one (1) acre in size. In urban area the minimum mapping unit for forest and vegetation areas would be ¼ acre in size. All polygons would be reviewed or recompiled in accordance with the new imagery. This product would be designed for use and display at a 1:2400 display level which is consistent with the large scale imagery.

## **9.0 Required Project Polices, Guidelines, and Methodologies**

The Task Order Contractor shall be required to comply with all applicable laws, regulations, policies, standards and guidelines affecting information technology projects, which may be created or changed periodically. The TO Contractor shall adhere to and remain abreast of current, new, and revised laws, regulations, policies, standards and guidelines affecting project execution. The following policies, guidelines and methodologies can be found at [http://www.purchasing.alabama.gov/pages/rules\\_regs.aspx](http://www.purchasing.alabama.gov/pages/rules_regs.aspx).

## **9.1 Minimum Qualifications**

Only those Contractors that fully meet all minimum qualification criteria shall be eligible for contract proposal evaluation. The Contractor's proposal and references will be used to verify minimum qualifications.

Minimum qualifications are the criteria that determine whether the entire proposal will be evaluated. These entry criteria must be exact, tangible, pass/fail and possible to be met. Any proposal not meeting a minimum qualification will be rejected. In the case where a proposal includes personnel minimum qualifications, ANY ONE individual not meeting a minimum qualification will cause the entire proposal to be rejected. The Contractor's proposal shall demonstrate satisfaction of the following minimum requirements:

### **9.1.1 Vendor's Company Minimum Qualifications**

The Task Order Contractor shall be capable of furnishing all necessary services required to successfully complete all tasks and work requirements and produce high quality deliverables described herein. The Master Contractor shall demonstrate, in its proposal, that it possesses such expertise in-house or has fostered strategic alliances with other firms for providing such services:

The Master Contractor shall demonstrate experience in each of the following areas, as demonstrated by a minimum of 2 examples of similarly-sized projects (as determined by geographic area) completed successfully within the last three (3) calendar years:

- Digital orthophoto data collection, processing and delivery;
- Project management of digital orthophoto data collection, processing and delivery;
- Deploying, operating and managing the safe operation of the fixed-wing aircraft;
- Obtaining any necessary flight clearances required to access the operational area;
- Managing the large amount of digital data associated with digital orthophoto image collection and processing;
- Acquiring, processing and validating the ground survey, digital surface model, the Inertial Measurement Unit (IMU) and the Differential Global Positioning System (DGPS);
- Color balancing image tiles;
- Generating digital orthophoto imagery;

The Master Contractor shall demonstrate experience in the following areas, as determined by a minimum of 1 example demonstrating the successful execution of similarly-sized projects (as determined by geographic area) completed successfully within the last three (3) calendar years. Success is defined as full lifecycle implementation of the Vendor's proposed Quality assurance and Quality Control processes.

- Provide one or more examples of Quality Assurance and Quality Control processes, including use of web based tools completed successfully within the last three (3) calendar years. Success is considered to be satisfactory performance of the vendor's process. Provide one or more examples of large-scale, orthophoto imagery projects completed

successfully within the last three (3) calendar years. Success is considered to be satisfactory performance of the vendor's process.

- Demonstrate experience in providing each of the optional services listed below as described in at least one example:
  - Optional service 1 (See Section 9.1.5)
  - Optional service 2 (See Section 9.1.6)
  - Optional service 3 (See Section 9.1.7)
  - Optional service 4 (See Section 9.1.8)

### **9.1.2 Vendor's Company Minimum Qualifications**

Only those Vendors supplying key proposed personnel that fully meet all minimum qualification criteria shall be eligible for RFP proposal evaluation.

The proposed staff shall meet the following minimum qualification criteria for the Vendor to be eligible for consideration in the evaluation of this RFP.

Resumes shall clearly outline starting dates and ending dates for each applicable experience or skills.

#### **Project Manager**

The Contractor Project Manager shall have at least five (5) years of project management experience and be a Certified PMP, GISP, or Certified Photogrammetrist.

#### **Lead Field Surveyor**

Lead Field Surveyor shall be licensed in Alabama.

### **9.1.3 Government Furnished Materials**

The state will provide upon request the following data for the purposes of estimating and project planning:

- Project Boundary shapefiles – land area and political boundaries
- Existing geodetic network shapefile
- LiDAR DEM where available
- Boundaries of selected local buy-up project areas
- Buffer areas used in previous projects