

REQUEST FOR PROPOSALS

2016 Digital Orthoimagery Collection Project

Issued January 18, 2016

Submittals are due by 5:00 PM on February 8, 2016

Interested contractors are encouraged to subscribe to SRTA's bid posting webpage at <http://www.srta.ca.gov/bids.aspx> to receive notices when information, and possible request for proposals (RFP) addenda, become available.

**Shasta Regional Transportation Agency
1255 East Street, Suite 202
Redding, CA 96001
(530) 262-6190**



2015 SRTA Board Members and Agency Partners

Board Members

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Affiliation

Redding Area Bus Authority
County of Shasta
County of Shasta
County of Shasta
City of Anderson
City of Redding
City of Shasta Lake

Agency Partners

Caltrans, District 2
City of Anderson
City of Redding
City of Shasta Lake
County of Shasta
North State Super Region (NSSR)
Pit River Tribe
Redding Area Bus Authority (RABA)
Redding Rancheria (Yana, Wintu, Pit River)
Shasta Senior Nutrition Programs (SSNP)
Far North Regional GIS Council (FarNorCalGIS)

Introduction

Shasta Regional Transportation Agency (SRTA) is the designated Metropolitan Planning Organization (MPO) for the Shasta County region. Member agencies are the cities of Anderson, Redding, and Shasta Lake, the county of Shasta and the Redding Area Bus Authority (RABA). Information regarding SRTA, regional plans and programs, and this procurement are available online at www.srta.ca.gov.

SRTA seeks proposals and cost bids from qualified contractors for the 2016 Digital Orthoimagery Collection Project. SRTA is the procurement agency for the project; financing is provided in conjunction with the following partner organizations: cities of Redding, Shasta Lake, and Anderson; McConnell Foundation; and Western Shasta Resource Conservation District. A single contractor shall be selected and awarded the contract for the scope-of-work described in this RFP. All proposals submitted become the property of SRTA and will not be returned. SRTA and the partner organizations are not responsible for any costs incurred by the respondents in preparation of proposals.

SRTA's contribution to the project is funded by Federal Highway Administration Planning and Research Funds.

Background

SRTA and other agencies participated in an orthoimagery collection project in 2010 that resulted in 6" digital orthoimagery that forms the current base imagery for agencies and jurisdictions in the Redding region. The intent of this RFP and the project is to collect imagery of a quality that would align with the imagery from the 2010 project.

The project participants use digital imagery within computerized mapping systems such as Esri ArcGIS desktop and web server software and AutoDesk AutoCAD map drafting software on desktop and server systems.

Project Area

The project area, with approximate size and boundaries, is illustrated in Attachment B – Project Area Map for the 2016 Digital Orthoimagery Collection Project. The project area extends approximately from the southern boundary of the community of Cottonwood northward to Shasta Dam, and from Redding's Buckeye Treatment Plant on the west, to the east side of Anderson. The project area is approximately 180 square miles.

Imagery Description

Digital aerial photography, ground control, aerial triangulation, Digital Elevation/Terrain Models (DEM/DTM), and digital color orthoimagery may need to be collected for the project.

DEM/DTM and ground control data from the 2004 aerial imagery project will be made available at no cost to the selected contractor if these data sources can be used in the 2016 project to reduce project costs while retaining the technical specifications for the project. The technical specifications and deliverables for the 2016 project are described in Attachment A – Scope of Work for the 2016 Digital Orthoimagery Collection Project. This RFP and the attachments will be the contracted scope of services to be performed.

The final product from the scope of work will be tiled digital color orthoimagery in TIFF/TFW format and composite MrSID compressed format. Imagery will need to be rectified to ground coordinates and provided at a pixel resolution of three (3) inches (1/4-foot). Imagery is to be provided rectified to the California State Plane Coordinate System, Zone I, North American Datum of 1983 with units in U.S. Survey Feet.

Time is of the essence for this project as all imagery must be collected during leaf-off winter conditions early in 2016. The window for collecting the imagery is short and dependent on weather and other conditions. Aerial imagery must be collected between early February and late March during cloudless day conditions when the sun angle causes the fewest shadows and before leaves, buds, and other vegetation blooms obscuring the ground.

Options

Proposals may optionally include costs for pixel resolutions of 4 inch and 6 inch with all other technical specifications unchanged. SRTA in conjunction with partner organizations may choose to have the 2016 Digital Orthoimagery Collection Project captured at a lower resolution.

Timeline

An estimated project schedule is provided below.

Task	2015/2016 Dates
Prepare and publish the solicitation	Dec 18 to Jan 8
Prepare the technical scope-of-work for RFP	Dec 18 to Jan 18
Prepare QA/QC acceptance criteria for RFP	Jan 4 to 18
Finalize and release the RFP	Jan 18
Deadline to receive proposals	Feb 8
Proposal review period	Feb 9 to Feb 12
Finalize Technical Services Agreement	Feb 12-16
Project kick-off	Feb 24

Aerial imagery collection window	Late Feb – late March
Preliminary deliverables from contractor	April to May
Review and QA/QC period	June
Revision by contractor, if needed	July
Final QA/QC acceptance period	August
End of project	September

Proposal Contents

Proposals must clearly describe the methods and qualifications of the firm(s) that will be used in the project. At a minimum, the following information should be included and clearly labeled to be considered competitive:

1. Transmittal letter--signed by an officer who may contractually bind the business, including a description of the firm. The letter shall include a brief statement of an understanding of the project and highlights of the firm's qualifications relative to the project. Include the name, address, email, and telephone number of the person(s) who will act as project manager for the proposal and the project. The proposal shall be a firm offer for a minimum of 45 days, and contain a statement to that effect. The proposal shall contain a statement that all activities performed within the proposed scope of work, notwithstanding SRTA unforeseen needs, will be performed at a fixed price.
2. Overview of the Company – Provide a description of the type of services offered by the firm and subcontractors. Describe the length of time the company has been providing the services; the type of ownership of the firm; the number of employees involved in providing the type of services described in this RFP; and the location of offices that would provide the services for this project.
3. Key Project Staff – Describe the relevant experience of the project manager who will guide the project. The project manager would be the person assigned by the Contractor to communicate with the designated representative from SRTA on business and technical aspects of the proposal and the contacted scope of work. For each key person who would be assigned to the project, provide a brief description of their role in the project and a short resume. Include any professional registration and certification for key staff. Do not include descriptions or resumes of company staff who would not be participating on the project. This includes Contractor's sub-contractors or vendors.
4. Work Outside of the U.S. -- Describe any portion of the project that will be conducted outside the United States, either by the Contractor or one of the Contractor's sub-contractors or vendors.

5. Related Experience and References -- Include a short description of up to 6 relevant projects that demonstrates successful completion of similar projects for similar clients. Include projects where the Contractor has worked with any or all proposed sub-contractors or vendors. In addition to technical expertise, the selection criteria will rely more heavily on references from similar projects in Northern California during leaf-off winter conditions. For each relevant project, include the role of the firm as lead or subcontractor, the name of the end-client who received the products and services, the name of the prime contractor, and the name(s) and contact information of the person(s) who is the reference for the project.
6. Proposed Approach to the Project – Describe the proposed approach to the project in sufficient detail that SRTA and partner organizations will have an understanding of the technique and methods to be used to meet the scope of work. Provide detailed information on the role of any subcontractor or vendor. Describe the type of equipment to be used and the technology that will be involved. Provide a work plan and schedule to complete the project scope of work identifying milestones and deliverables. Provide information in the proposal sufficient to describe the requirements for Section 4.3 of the Scope of Work in Attachment A including but not limited to:
 - Preliminary flight plan
 - Ground and aerial control methods
 - DEM/DTM creation
 - Flight specifications
 - Aerial triangulation
 - Ortho processing
 - Quality assurance and quality control

Describe any proposed deviations from the Scope of Work that is described in Attachment A.

The weather during the flight window of February to April 1, 2016 is extremely variable in Northern California. Describe the approach that will allow quick mobilization of resources to acquire the imagery during the short window of time. Describe the location of people, equipment, planes, and other resources that will be used for the imagery acquisition portion of the project.

Provide a description of actions that would be taken to ensure that the products will be delivered within the proposed schedule. A proposal that does not include sufficient information to address these issues or a proposal that does not provide enough detail to determine the technical approach may disqualify a proposal from selection.

7. Cost Proposal -- Provide a cost proposal for the project using the Cost Proposal Form in Attachment C. The cost proposal must be divided into parts with a separate cost for the

3-inch imagery and options for 4-inch and 6-inch imagery. The cost proposal shall be fully inclusive of all services, overhead, and direct expenses. SRTA intends to select a single resolution of imagery to be collected based on available funding for the project.

Three (3) copies of the proposal and cover letter must be received by 5:00 PM Pacific Standard Time, Monday, February 8, 2016, to be considered.

RFP Questions, Contact Person, and Schedule

Questions

Questions concerning this RFP will be responded to collectively, and made available for interested contractors via the SRTA website. All email inquiries must be submitted no later than 5:00 PM on Wednesday, January 27, 2016, to the below contact person. **No oral questions will be taken or responded to.** Responses to questions will be posted on the [SRTA website](#) no later than Thursday, January 28, 2016. Interested contractors must view or subscribe to SRTA's bid posting webpage at <http://www.srta.ca.gov/bids.aspx> so that they are notified of any addenda to the RFP, or for responses to questions received.

Contact Person

Jennifer Pollom, MS, AICP, GISP
Senior Transportation Planner
c/o 2016 Digital Orthoimagery Collection Project
Shasta Regional Transportation Agency (SRTA)
1255 East Street, Suite 202
Redding, CA 96001
jpollom@srta.ca.gov
530-262-6195

Schedule

SRTA and partner organizations will select a contractor by mid-February 2016 and initiate the contract by late February. The Contractor will complete the aerial imagery acquisition by April 1, 2016 and complete the project with final delivery of all project deliverables by September 1, 2016. The RFP schedule follows.

Tasks	Deadline
Release RFP	January 18

Interested Contractor Questions Due	5:00 PM, January 27
SRTA Response to Contractor Questions	No later than January 28
Contractor Proposals Due	5:00 PM, February 8
Evaluation and Ranking of Proposals	February 9-12
Contractor-SRTA Technical Services Agreement, including Budget and Scope of Work	February 12-16
SRTA Board of Directors Approval	February 23
Contract Start	February 24

Proposal Evaluation

The following criteria will be used to evaluate proposals. Although cost is a factor, it is only one of the factors to be evaluated and proposals will not be awarded based solely on lowest cost. Positive references on similar projects, especially in Northern California leaf-off conditions, will have a higher weight than the project fee.

1. Compliance with RFP Instructions – The proposal should follow the instructions in this RFP. There should be sufficient information for SRTA to evaluate the suitability of the proposal. A standard boiler-plate proposal or company marketing material will not be accepted as a qualified proposal.
2. Technical Expertise and Experience – The experience and expertise of the firm and their subcontractors will be evaluated based on work on similar projects and the core services provided by the firm.
3. Technology and Equipment – It is highly advantageous to propose a digital camera approach to the project. Proposals that include the most current and industry standard technology will receive the highest consideration.
4. Technical Approach – The technical approach should not deviate extensively from the Scope of Work described in Attachment A. However, unique and cost-effective approaches will be considered. An approach that is proposed primarily to cut costs with resulting loss of accuracy or benefit will likely not be considered.
5. Quality Assurance – Proposals with distinct and measurable quality assurance components will receive higher consideration.
6. Professional Registration – Because of the nature of the project, SRTA expects that an ASPRS Certified Photogrammetrist will be included on the project team. The team should also include a professional registered land surveyor or an explanation why these professionals are not required for the proposed approach.

7. Business Registration – The proposed Contractor should be licensed to do business in the State of California.
8. Qualifications of Key Staff – The qualifications and expertise of the project manager will be evaluated. The project manager will be the key contact for any technical or business issues that arise during the course of the project.
9. Schedule and Availability – The proposed schedule and available equipment, people, and resources will be of primary importance to successful execution of the project. This is especially a concern with the short window of time to acquire imagery and the likelihood that the Contractor will need to mobilize quickly during the short periods of time when the weather and conditions are suitable.

Proposals that indicate how the Contractor plans to mobilize quickly for aerial acquisition will receive the highest consideration. Proposals should indicate any other projects that may compete for resources and how the proposed Contractor will assure that the resources are available for this project.

10. Project Examples and References – Proposals without references and project examples will not be considered. Proposals with completed similar projects where the proposed Contractor was the prime contractor will receive highest consideration. Projects completed in Northern California during winter leaf-off conditions will also receive higher consideration. References will be a key component during the evaluation of a proposal.
11. Sample Digital Orthoimagery – Although not required, it would be favorable to include a sample digital orthoimage from a project reference. SRTA would use the sample image to evaluate the quality and compatibility with their current systems and imagery.
12. Fee and Payment Schedule – Although the total fee and payment schedule are important as SRTA and partners do not have an exhaustive budget for the project, the total fee and payment schedule will be considered as an element of the overall proposal.
13. DBE Requirement – SRTA has determined that disadvantaged business enterprises, as defined in 49 CFR Part 26, will have the opportunity to compete fairly for contracts financed, in whole or in part, with federal funds. SRTA has a disadvantaged business enterprise (DBE) goal of 5.1% for federal fiscal years 2015/2016/2017. SRTA encourages respondents to include the participation of DBE businesses within your proposal.

A panel will be formed to evaluate the proposals, and make a recommendation in consultation with the SRTA executive director, which will then go to the SRTA Board of Directors for approval. The proposal evaluation will be based on the scoring criteria above. In unusual

circumstances where a recommendation cannot be made based on the proposals alone, the highest ranked contractors may be invited to an interview.

Contract Amount and Award

The anticipated start date is February 24, 2016, with a June 30, 2017, contract expiration. Contractor selection will be based on a combination funding availability and the value of the services to be provided.

Barring any delays (i.e. the need for a budget amendment, extension of the RFP response date, etc.), the SRTA Executive Director will schedule the proposed technical services agreement for consideration by the SRTA Board of Directors on February 23, 2016. The agreement is not in force until approved by the SRTA Board of Directors and written authorization to proceed is provided to the selected contractor.

Standard Consulting Agreement

SRTA's standard Technical Services Agreement (TSA) will be used for the agreement between SRTA and the selected contractor. SRTA's TSA template is provided by separate attachment to the RFP distribution.

Payment Schedule and Penalties

SRTA proposes three (3) billings for payment at the of project milestones: Billing #1 will amount to 25% of the total project fee and payable after completion of the aerial imagery; Billing #2 will amount to 50% of the total project fee and payable after delivery of all the project materials and deliverables to SRTA as described in Section 4.3. of the Scope of Work; and Billing #3 will amount to the final 25% of the project fee and payable after acceptance of all project materials and deliverables based on the Acceptance Criteria for the deliverables described in Attachment D.

If an alternative payment schedule is proposed, SRTA may also impose a payment retention clause in the contract where SRTA will retain 10% of the scheduled amount billed until completion and acceptance of the project deliverables. The payment retention may be waived depending on the proposed payment and deliverable schedule.

SRTA will impose a late penalty for deliverables and materials from Section 4.3 of the Scope of Work that are not delivered to SRTA on or before the agreed scheduled final delivery date. SRTA will penalize the Contractor \$200 for each business day the final deliverable is not received by SRTA beyond September 1, 2016. Business days are normal work days excluding Federal holidays and weekends.

The penalty fees will be retained by SRTA from the final billing amount after acceptance of the deliverables.

Protest Procedure

All protests, signed by the protesting party, must be in writing within three (3) business days from the results notification and be addressed to the SRTA Executive Director. Include a description of the expected relief or corrective action in the protest. The protest should stipulate an issue of fact concerning the following points:

- A matter of bias, discrimination, or conflict of interest on the part of an evaluator(s);
- Errors in computing the score; and/or
- Non-compliance with procedures described in this RFP or SRTA's established policies.

SRTA will only consider protests based on the above points. SRTA will reject protests without merit if they address issues such as an evaluator's professional judgment on the objective quality of a proposal. The SRTA Executive Director will review and respond to protests within five (5) business days from receipt. Protests considered unresolved by the protesting party will be forwarded to the SRTA Board of Directors either at the meeting at which the subject contract is under consideration, or at a meeting which takes place prior to that, if timely response from the protesting party is received by SRTA.

Debriefing

SRTA will provide an informal debriefing to interested contractors not selected for this project.

Proposal Submittal

Please submit contractor proposals to:

Shasta Regional Transportation Agency
Attn: Jennifer Pollom
1255 East Street, Suite 202
Redding, CA 96001
jpollom@sрта.ca.gov

Submittals must be received at the SRTA office by **5:00 PM on February 8**. No proposals will be accepted after this time. **Postmarks are not acceptable**. Contractors must submit their proposal **by email**. Proposal receipt will be acknowledged by email.

The cost of preparing and submitting a proposal and participating in an interview—if held—are at the sole expense of the contractor. SRTA reserves the right to reject any or all proposals, and to waive any informality, technical defect, or clerical error in any proposal at SRTA's discretion.

Solicitation of proposals in no way obligates SRTA to contract with any firm or individual. The decision to approve and award a contract is at the discretion of SRTA.

Public Records Act: All proposals submitted in response to the RFP will become the exclusive property of SRTA. At such time the SRTA Executive Director recommends a proposal to the board of directors and such recommendation appears on the board agenda, all proposals submitted in response to the RFP shall become a matter of public record and shall be regarded as public records. **If there are any trade or proprietary secrets included by the contractor, the contractor may provide a different copy of the proposal that would be acceptable to release to the public. If an alternate document is not made available to SRTA by the contractor, then the original proposal, as submitted, will be released as requested.** Proprietary information can include secret formulas, processes, and methods used in production. It can also include a company's business and marketing plans, salary structure, customer lists, contracts, and details of its computer systems. In some cases, the special knowledge and skills that an employee has learned on the job are considered to be a company's proprietary information.

Modification or Withdrawal of Proposal: Any proposal received prior to the deadline may be withdrawn or modified either personally, through e-mail, or by written request of the contractor. To be considered, the modification must be received in writing (email preferred) prior to the deadline. Proposals may be withdrawn following the proposal deadline for good cause; please consult with the RFP contact person to discuss this.

RFP Addendum(a): Any changes to the RFP will be made by written addenda issued by SRTA, and shall be considered part of the RFP. The RFP deadline may be extended dependent upon the nature of the changes issued. Upon issuance, such addenda shall be incorporated into the agreement documents, and shall prevail over inconsistent provisions of earlier issued documentation. Any addenda will be posted on-line only. It will be the contractor's responsibility to assure that all addenda are incorporated into the proposal as required according to all the terms and conditions for submittal of the proposal. In no event will SRTA modify the RFP with less than five (5) days remaining to the deadline, without extending the RFP deadline.

Alteration or Cancellation of the RFP: SRTA reserves the right to cancel this RFP at any time for any reason. SRTA may also elect to alter the scope of work to include additional services, products, or coverage area, or to remove some coverage areas. Should SRTA elect to alter the scope of work, then the selected Contractor will be asked to resubmit the cost proposal. SRTA and partner organizations have the right to negotiate with a different contractor for the project should the selected Contractor and SRTA not arrive at an agreed cost for the altered scope of work.

Verbal Agreement or Conversation: No prior, current, or post-award verbal conversations or agreement(s) with any officer, agent, or employee of SRTA shall affect or modify any terms or obligations of this RFP, or any contract resulting from this procurement.

Special Funding Considerations: Any contract resulting from this RFP will be financed with funds available to SRTA. The contract for this service is contingent upon the provision of these funds to SRTA. In the event these funds are reduced or eliminated, SRTA reserves the right to terminate or revise any contract.

Alternatives: Contractors may not alter objectives and deliverables of the RFP in the response to the RFP. If the contractor brings to SRTA's attention, at least ten (10) days before the RFP deadline, an alternative end product than the RFP delineates, SRTA reserves the right to cancel the RFP and re-bid the project.

DBE Requirement: SRTA has determined that disadvantaged business enterprises, as defined in 49 CFR Part 26, will have the opportunity to compete fairly for contracts financed, in whole or in part, with federal funds. SRTA has a disadvantaged business enterprise (DBE) goal of 5.1% for federal fiscal years 2015/2016/2017. SRTA encourages respondents to include the participation of DBE businesses within your proposal.

Buy America: Buy America regulations apply to federally assisted procurements, typically development and/or construction activities subject to a NEPA determination, exceeding certain amounts. Buy America Regulations require the contractor to provide goods produced or manufactured in the US, unless the federal government has granted a waiver authorized by those regulations.

Equal Employment Opportunity/Affirmative Action: In awarding a contract, SRTA includes language within the contract which requires the contractor to certify their compliance with federal regulations.

Attachment A
Scope of Work for the 2016 Digital Orthoimagery Collection Project
Shasta Regional Transportation Agency

1. Introduction

This scope of work for the Shasta Regional Transportation Agency (SRTA) is the project specifications to acquire natural color 3-inch (1/4-foot) resolution digital orthoimagery. The project entails the acquisition of digital aerial imagery for approximately 180 square miles as illustrated in Figure A, Project Area Maps. The resulting 3-inch pixel resolution digital orthoimagery shall meet Class I Accuracy Standards based on the American Society of Photogrammetry and Remote Sensing (ASPRS) Accuracy Standards for Digital Geospatial Data.

The contractor shall perform a comprehensive range of photogrammetric mapping services including:

- Leaf-off acquisition of digital aerial imagery
- Survey control (ground and airborne) where needed
- Fully analytical aerial triangulation
- Digital Terrain Model (DTM)/Digital Elevation Model (DEM) developed to support orthoimagery production.
- Rectify color (Red-Green-Blue or RGB) orthoimagery at a 3-inch ground sample distance (GSD)

2. Technical Specifications

Coordinate system, positional accuracy and flight dates

2.1 Coordinate System and Datum

All data shall be geo-referenced to the California State Plane Coordinate System, Zone I, North American Datum (NAD) 83 horizontal datum (Well Known ID WKID 2225, NAD_1983_StatePlane_California_I_FIPS_0401_Feet), and the North American Vertical Datum (NAVD) 88. All final values shall be in U.S. Feet.

2.2 Accuracy Specifications

2.2.1 Horizontal and Vertical Accuracy

Horizontal and vertical accuracy of the imagery shall meet Class I Accuracy Standards based on the ASPRS Accuracy Standards for Digital Geospatial Data.

2.3 Flight Specifications

2.3.1 Flying dates

Imagery shall be flown when deciduous foliage is under primarily leaf-off conditions. The target flight window shall be within February 1, 2016 and April 1, 2016. Imagery acquisition should be collected in a single day to insure uniform imagery.

2.3.2 Flight hours

The sun angle for all flights shall be at least (30) degrees above horizon and imagery shall be acquired between 10:00 am and 2:00 pm local time. In no case shall imagery be undertaken when the ground is obscured by snow, fog, smoke or dust. Aerial imagery shall be flown when streams are their normal banks, and cloud shadows appear on less than five percent (5%) of the area in any one image. Imagery shall not contain objectionable shadows caused by relief or low solar altitude.

3. Production Methodology Specifications

Aerial acquisition, geodetic engineering and photogrammetric post processing requirements

3.1 Aerial Acquisition

3.1.1 Digital Aerial Camera

The aerial camera shall be a precision digital aerial camera equipped with low distortion, high-resolution optics and high pixel count charge-coupled device (CCD) sensors. It must be capable of:

- Ground resolution equal to or better than 0.25-foot
- Generating three-band imagery from separate co-registered red, green, and blue bands.
- Support high geometric accuracy and forward motion compensation.
- Production of a camera calibration report as a deliverable item

3.1.2 Flying Height

The aerial acquisition flying height shall be capable of achieving a ground sample suitable for output resolution of 0.25-foot GSD. The proposed flight height shall be included in the flight plan submitted as described in section 3.1.3 below.

3.1.3 Flight Planning

A flight map shall be submitted for the given project area prior to acquisition. Flight line features shall be attributed with appropriate identification information including project boundary, line numbers, and exposure stations, and ground control locations. The flight line shall be north-to-south unless otherwise agreed on with SRTA.

The principal points of the first two and the last two exposures of each flight line shall fall outside the boundaries of the area to be covered by the flight, and all side boundaries shall be covered by a minimum of 25% of the photo image footprint. The aerial mission shall be flown with coverage extending beyond the project boundary to ensure adequate coverage.

3.1.4 Stereo Images

Overlapping images in each flight line and between flight lines shall provide full stereoscopic coverage of the area to be mapped. Appropriate endlap, sidelap and adjustment for crab and tilt shall be accounted for to meet the output specification. Flight lines shall be arranged to allow for an 80% forward overlap of images and a 60% sidelap of images to reduce the appearance of leaning building, trees, and other vertical features.

3.1.5 Aerial Imagery Review

Contractor shall review the processed digital frames for the following:

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

3.1.6 Re-flights

Unacceptable aerial imagery shall be corrected at no additional cost to SRTA, with the re-flight coverage overlapping the acceptable imagery by at least two (2) stereo models. Re-flights shall be flown within the season, hours, and conditions specified in section 2.3.

3.2 Global Positioning System (GPS) Ground Control

The primary purpose of the required survey control for this project is to produce an aerotriangulation solution accurate enough for orthophoto production. The contractor shall tie into existing control networks whenever possible, and any ground control established for this project must meet minimum accuracy requirements, and reporting requirements set forth here.

Ground control shall be established with survey grade instrumentation under the direct supervision of a licensed professional surveyor. Contractor shall coordinate GPS control survey with the licensed surveyor or engineer representing SRTA if requested.

3.2.1 Collect airborne GPS and imagery data

The contractor may use airborne GPS (AGPS) techniques to supplement the ground control data. Airborne GPS solutions shall be required to utilize dual-frequency GPS systems during the aerial imagery missions. The contractor will use post-process kinematic techniques or real-time kinematic techniques to relate the airborne GPS data to simultaneous observations collected at fixed land-based reference stations. Geodetic positions corresponding to the photo

centers at the instant of exposure shall be calculated and (later) combined with existing control point values in an analytical aerotriangulation solution.

The contractor shall use AGPS techniques that provide high accuracy camera station coordinates. During the acquisition of the imagery, survey grade geodetic receivers shall be equipped on the aircraft and referenced to at least two ground stations. All instruments shall collect data at a sampling rate of 1.0 second with the aircraft receiver logging photograph exposure times as external events. A camera calibration report shall be delivered to SRTA that illustrates that were used during imagery collection.

3.2.2 Monumentation

The contractor shall be responsible for pre-flight paneling and/or post flight photo identification of all control points. The Contractor shall recommend and coordinate the placement of control target locations of a sufficient quantity and size to control the photogrammetric accuracy specifications required for 3-inch GSD orthoimagery. Panels shall be removed upon the completion of the project. Actual placement of control paneling shall be a negotiated item in coordination with SRTA to determine most cost effective methods for placement, maintenance and removal.

3.2.3 Permission

The contractor shall be responsible for obtaining all permits, permission, or traffic control that may be required to enter upon any lands or use of any Public Right-of Way where access to accomplish the ground control survey is necessary. The permits, permission, or traffic control shall include obtaining permission to set or establish targets prior to the flight, for identification on the imagery.

3.2.4 Survey Report and Deliverables

Upon completing the ground control phase, the contractor shall prepare and submit a Final Survey Report to SRTA. The report shall provide the following information:

- Detailed description of ground control coordinates and locations.
- Description of coordinates captured from the airborne GPS collection.
- Summary of accuracies achieved, problems encountered, and a statement of the overall quality of the survey in terms of its use with airborne GPS.
- Schematic control diagram of the survey records on a map for all basic horizontal control used in the project.
- Digital file of ground coordinates and airborne GPS coordinates and metadata in Esri ArcGIS compatible format

3.3 Aerial Triangulation

Softcopy Aerial Triangulation shall be used to obtain high accuracy exterior orientation.

3.3.1 Accuracy

The positional accuracy (vector of both X and Y coordinate errors) of tiepoints established by aerial triangulation shall be sufficient to support the production of digital orthophotos meeting the accuracy standards contained herein.

The positional accuracy of passpoints and tie points established through aerotriangulation shall meet or exceed the root mean square error (RMSE) accuracy standards for Class I orthoimagery as defined by ASPRS.

3.3.2 Checkpoints

Checkpoints are horizontal/vertical control points that have been established by ground control procedures throughout the photo block for accuracy checking purposes. The positional values of these points may subsequently be used in the aerial triangulation adjustment once the checks have been evaluated and approved.

For new survey ground control, a minimum 1/3 of the GPS survey ground control points will be withheld from the initial adjustment. The calculation of the positional values (x,y,z) for the independent checkpoints shall be used as an initial check of the accuracy.

The contractor will evaluate the horizontal accuracy of the orthoimagery using the independent ground checkpoints of high accuracy that are not used in aerotriangulation or initial georeferencing of the imagery. Computed accuracy must meet or exceed the 95 percent National Standard for Spatial Data Accuracy (NSSDA) Confidence Interval which is 1.25 feet for 3-inch digital orthoimagery.

3.3.3 Aerial Triangulation Report

Upon completion of all aerial triangulation the contractor shall prepare an aerial triangulation report for submission to SRTA. The aerial triangulation report shall include:

- Summary of aerial triangulation results.
- Descriptions of laboratory equipment, procedures, and computer programs used.
- Summary of RMSE errors for bundle adjustment, photographic measurement, tie point and control/check points.
- Significant misfits encountered at control points and procedures taken to analyze and rectify such misfits.
- A listing of all misclosures at ground control points with and without use of checkpoints.

- Computer printout of the final, adjusted analytical triangulation solution to horizontal and vertical ground control.
- State Plane Coordinates for all ground control points, passpoints, and checkpoints.
- Identification of all points that were included in the initial solution and subsequently discarded, with an explanation of the reasons for being discarded.
- Identification of the weighting factors applied to all points used in the final solution.

3.4 Digital Terrain Model (DTM)/Digital Elevation Model (DEM)

A Digital Terrain Model (DTM)/Digital Elevation Model (DEM) shall be developed at a density level necessary to support the orthophoto production. SRTA has a DEM that was built in 2004 that the contractor may use to support orthophoto production. This DEM only covers a portion of the project area. SRTA does not guarantee that this DEM is in a format or has the accuracy, precision, and coverage suitable to use for this scope of work. If the contractor proposes to use this existing DEM or any other materials provided by SRTA, the contractor must first describe how the DEM will be used and get approval of SRTA before using these data sources.

Data from the 2010 digital imagery collection project as well as other geographic information system (GIS) data and map layers are available to download from the City of Redding web site at:

<http://www.cityofredding.org/departments/information-technology/gis-maps/data-download>

3.4.1 DTM/DEM Production

Terrain/elevation data used in the development of the DTM/DEM shall be captured by photogrammetric techniques using a 1st order analytical stereoplotter or a softcopy workstation or derived from recent LIDAR-derived data. The DTM/DEM shall consist of points spaced at regular intervals along a grid, points of significant high or low elevations, and ortho specific breaklines at all significant terrain breaks.

3.4.2 DTM/DEM Restrictions

DTM/DEM data from a prior orthoimagery project shall not be used for a new project unless approved by SRTA. DTM/DEM may be developed either wholly or in part from autocorrelation in the production of the digital orthoimages. A DTM/DEM is not to be stored as a record (Z component) for each pixel of the orthoimage.

3.4.3 DTM/DEM Deliverables

The primary purpose of the DTM/DEM is to support orthoimagery production. However, the contractor will deliver to SRTA any raw or processed DTM/DEM that is collected or created for the project. Be sure to describe the method and technique you intend to use for orthorectification (for example, autocorrection in whole or in part). It is not the intent of SRTA to increase project costs by developing a DTM/DEM as a deliverable that would exceed the needs to support orthophoto production.

3.4.4. DTM/DEM Ownership

SRTA shall maintain all rights of ownership for the final DTM/DEM.

3.5 Digital Orthoimagery

Digital orthoimagery shall be produced from the processed, digital imagery. Each processed image (raster file) shall be geo-referenced to simulate its position in space at the time of exposure. The Digital Terrain Model shall be applied to the raster file to rectify the image to eliminate distortion. All orthoimages shall be edge-matched, radiometrically corrected, and color balanced. Once the imagery has been processed, it shall be structured and formatted in a seamless image database and sampled to the required 3-inch pixel resolution.

3.5.1 Resolution

The final output resolution is 3-inch ground sample distance (GSD).

3.5.2 Radiometric Characteristics

All orthophotos shall be composed of three (3) R,G,B spectral bands: Red (R), Green (G), and Blue (B). The radiometric resolution of each band shall be eight (8) bits at minimum, where the image brightness for each band is represented by 256 levels, ranging from 0 to 255.

When a mosaic of two or more images is made, the brightness and color values of the other images will be adjusted to match that of the principal image. The seamlines between the overlapping images will be chosen to minimize tonal variations. Localized adjustment of the brightness and color values will be done to reduce radiometric differences between join areas. Changes in color balance across the project, if they exist, shall be gradual. Abrupt tonal variations between image files are not acceptable.

3.5.3 Image Quality

Orthoimages shall not contain defects such as out-of-focus imagery, marks, scratches, debris, artifacts, or inconsistencies in tone and density between individual orthoimages.

Radiometric Distortion - The Contractor shall correct distortions or warping caused by elevated or depressed structures such as bridges, rail beds, overpasses, and steep terrain. Distinct linear ground features, such as roads and curbs, must not deviate from their apparent path. SRTA may reject any image that contains these types of distortions.

Vertical Distortion – Bridges, overpasses, towers, and tall buildings should have minimal lean. These features should not extend over adjacent roadways, sidewalks or parking lots. Taller buildings should not displace more than 25% of any adjacent feature or structure.

Defects – The imagery should be free of defects from scratches, smears, blemishes, blur, debris, or artifacts.

Image Mosaicking - Where two or more digital orthoimages are mosaicked, the image judged to have the best contrast shall be used as the reference image. All other images shall have their brightness values adjusted to that of the reference image. Join lines between overlapping images shall be chosen so as to minimize tonal variations. Localized adjustment of the brightness values shall be performed to minimize tonal differences between join areas. Visible seams or sutures within a digital orthoimage which exhibit a noticeable “edge” or “feather” effect shall be grounds for rejection of that digital orthoimage.

Edge-Matching - All chips shall not have more than 3 pixels offset between the principal chip. Features from one image to adjacent image shall edge-match without visible offset.

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

3.5.4 Non-Image Data

Images shall not contain any non-image data. Non-image data includes photographic frame borders, fiducial marks, artifacts, and titling. Non-image data also includes "fill" induced by lack of elevation surface model coverage that results in white, black, or spurious intensity values.

3.5.5 Accuracy Relative to SRTA 2010 Imagery Collection

SRTA has a set of digital imagery as tiled Tagged Image Format Files (TIFF) and associated TIFF World Files (TFW) from a 2010 collection project. SRTA has based much of their GIS data on this imagery, including parcel boundaries and other boundary features. Although the digital imagery from the 2010 collection project has a GSD of 6-inches, it is the intent of SRTA to use the imagery from this project in conjunction with the 2016 imagery and GIS data. Therefore, the

contractor will need to compare orthoimagery produced in the 2016 orthoimagery collection project to the 2010 orthoimagery in order to delivery imagery with similar color, balance, and horizontal accuracy of the 2010 orthoimagery. If there are large variations in visual quality or positional accuracy between the 2010 orthoimagery and the 2016 orthoimagery, the contractor may be asked to provide evidence that the 2016 orthoimagery exceeds the quality and positional accuracy of the corresponding 2010 orthoimage tile in order for SRTA to accept the 2016 orthoimage as a final deliverable.

4. Delivery Specifications

Tiling scheme, delivery media, and final deliverables

4.1 Tiling Scheme

The Contractor shall label each TIFF/TWF with the name as indicated by the grid file naming convention to be provided by SRTA. Each TIFF/TWF tile will represent a grid based on the tiling grid illustrated in Figure 1. Each TIFF/TWF file will consist of 6,000 feet in width by 4,000 feet in height with 8 bit, 3-band RGB imagery. Tiles will be edge-matched to adjacent tiles. Corner coordinates of the imagery will be approximately matched to the corner coordinates of the grid file. Each final TIFF/TWF imagery file will contain overlap of 1 foot (4 pixels) to the adjacent grid that will result in a final imagery file size of 6,002 feet in width by 4,002 feet in height. There will be no gaps, missing data, or null pixels between adjacent tiles or within a tile except as described in Section 4.1.1. SRTA will provide the contractor with tiling grids as digital files in Esri Shapefile or AutoCAD DWG file format. The grids can be used as a template to create the TIFF file tiles. There are 259 separate tiles in the grid. A single composite compressed MrSID imagery file of the entire project area will also be produced from the final accepted digital imagery.

4.1.1 Partial Tiles

Imagery is to be collected within the Project Area Boundary indicated on the maps in Figure A – Project Area Maps. Any grid tile at the border of the Project Area Boundary may contain null data values for the pixels in the portion of the tile that is beyond the extent of the Project Area Boundary.

4.2 Data Delivery

All orthoimagery data shall be on USB 2 Hard Drive or other similar electronic media as agreed by with SRTA. Each disk or drive shall contain the following reference information:

- Date of imagery acquisition
- Contractor Name
- Date of delivery
- Listing of tiles on the disk or drive

A final review of all data will be conducted by SRTA and their Quality Assurance/Quality Control (QA/QC) contractor and checked for compliance with project specifications and media readability.

4.3 Project Deliverables

- Project Work Plan in both hard copy and digital format
- Project Flight and Survey Control Map (pre-flight)
- Final Survey Control Report in both hard copy and digital format
- Final Survey Control Points in Esri ArcGIS compatible format
- Digital camera calibration report
- Final Aerial Triangulation Report in both hard copy and digital format
- A statement of accuracy of the orthoimagery in both hard copy and digital format
- 3-band (RGB 0.25-foot pixel color digital orthophoto imagery, TIFF with TWF format in grid tile format based on the tiling scheme illustrated in Figure A. There will be a total of 259 imagery tiles delivered.
- One 20:1 compressed image (MrSID format) covering the imagery collection.
- Digital Terrain Model
- Federal Geographic Data Committee (FGDC) Compliant metadata for imagery files in XML format for each tile.

All final deliverable formats shall be coordinated between the contractor and the SRTA. All digital deliverables shall be fully compatible with the hardware and software platforms of SRTA.

4.4 Quality Control of Deliverables (QA/QC)

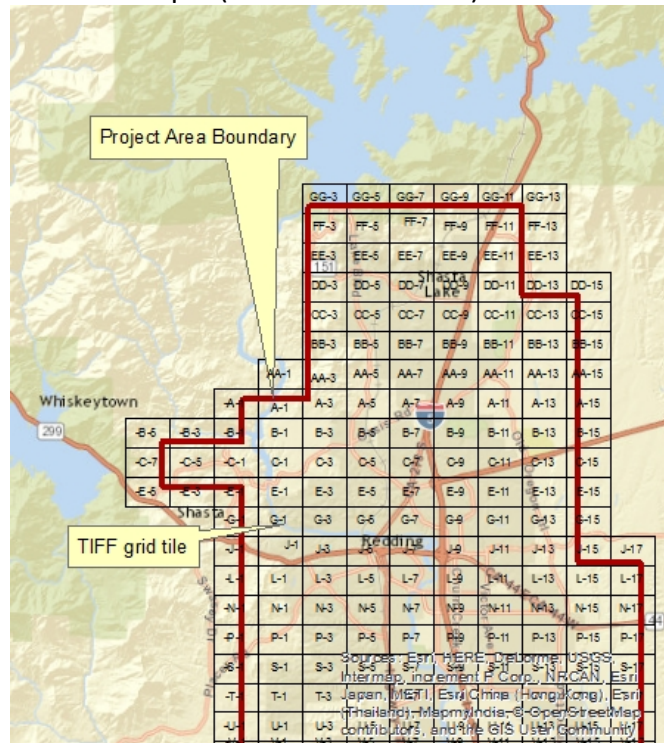
SRTA has the right to perform quality control and due diligence. Any image not meeting the requirements of this Scope of Work or in the Acceptance Criteria for Deliverables outlined in Attachment D may be rejected for non-compliance. The SRTA shall have sixty (60) calendar days to evaluate a deliverable for acceptance. SRTA has retained Interwest Consulting Group to assist with the QA/QC procedures.

5. Schedule and Project Work Plan

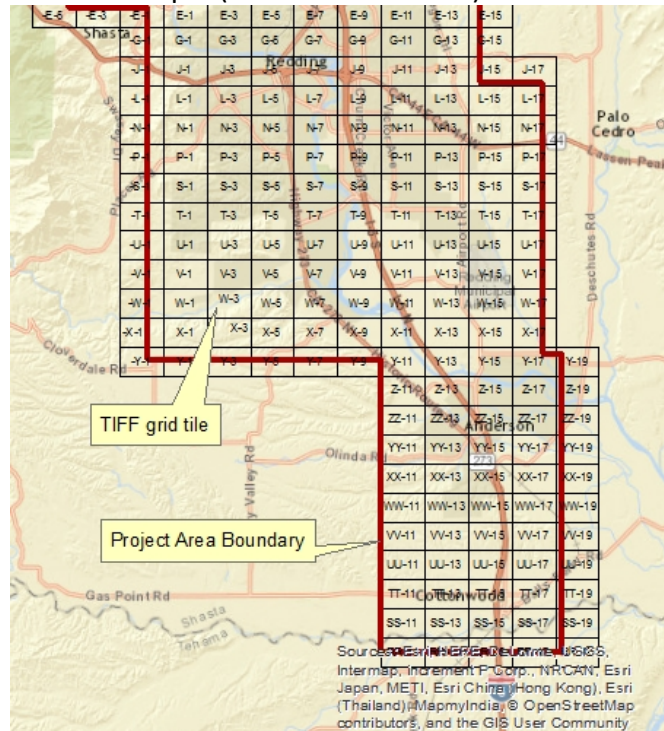
The contractor will provide a project work plan and schedule with tasks and dates for SRTA to review and approve. It is anticipated that the project will be completed and all deliverables accepted by SRTA no later than September 1, 2016.

Figure A
Project Area Maps

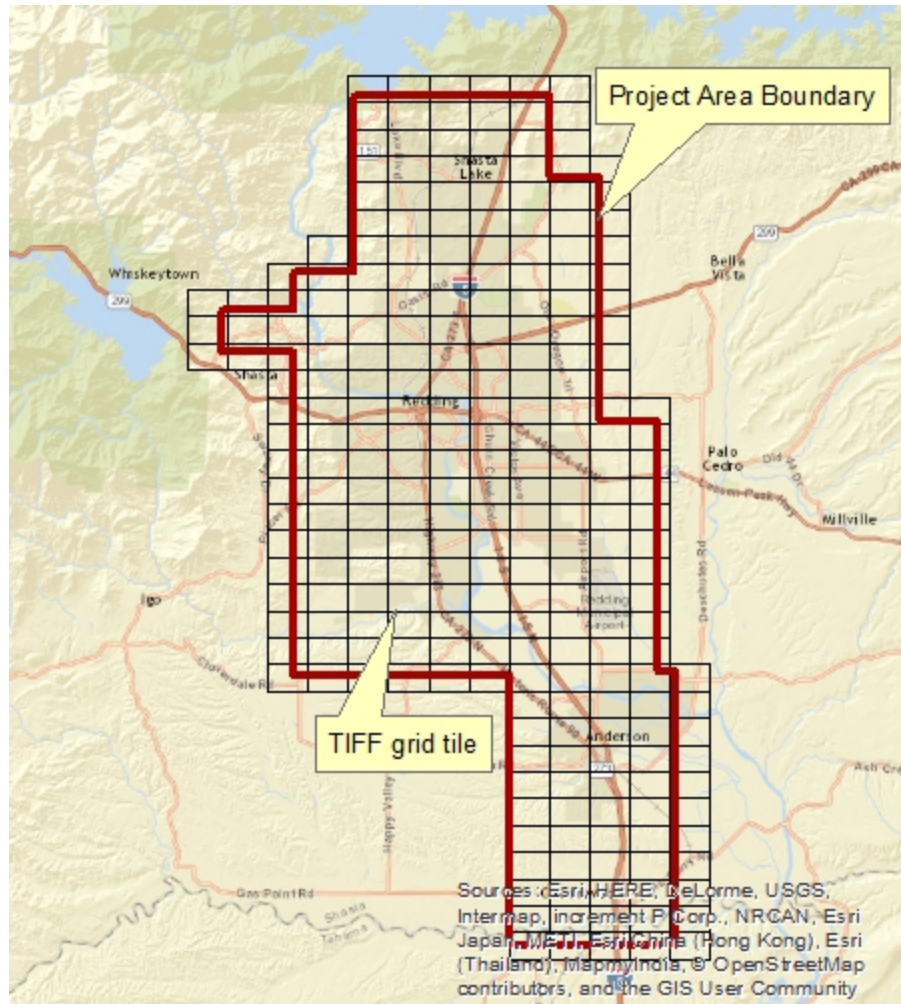
Location Map 1 (northern area tiles)



Location Map 2 (southern area tiles)



Attachment B
Project Area Map for the 2016 Digital Orthoimagery Collection Project
Shasta Regional Transportation Agency



Attachment C
Cost Proposal Form for the 2016 Digital Orthoimagery Collection Project

2016 Digital Orthoimagery Collection Project	Proposed Cost
3-inch imagery	
Options	
4-inch imagery	
6-inch imagery	

Attachment D

Acceptance Criteria for Deliverables for the 2016 Digital Orthoimagery Collection Project

All deliverables are required to pass a comprehensive evaluation and review process for acceptance and payment. This process will be used to validate all deliverables identified in section 4.3 of the Scope of Work for the 2016 Digital Orthoimagery Collection Project. Acceptance criteria will also be used to verify the positional accuracy of the imagery and ensure aesthetic and functional quality of the imagery products. SRTA will oversee this quality control process using in-house resources, project partners, a third party contractor, or some combination of all three. SRTA may reject any or all imagery tiles or other deliverables that fail to meet the acceptance criteria and evaluation listed below.

The acceptance criteria will be measured using the following quality assurance and quality control (QA/QC) methods using tools that include Esri ArcGIS-based visual inspection tools. The QA/QC guidelines will be used by SRTA or their representative. It is recommended that the contractor perform similar measurements and inspections during production phases before delivery of interim and final products.

Deliverables will be reviewed against the following acceptance criteria:

Project schedule and work plan. Provided to SRTA prior to collecting imagery data according to section 5 of the scope-of-work.

Flight plan map. A flight plan map is delivered prior to imagery acquisition that contains the elements described in section 3.1.3 of the scope-of-work.

Final report of ground control and aerial control. Review of the final report on the GPS ground and aerial coordinate locations used in the project according to section 3.2.4 of the scope-of-work.

Camera calibration report. This report is submitted to SRTA prior to processing the imagery as described in section 3.2.1 of the scope-of-work.

Aerial triangulation report. The aerial triangulation report that is submitted to SRTA according to section 3.3.3 of the scope-of-work will be checked for all components.

Media. All data files must be readable and transferrable to SRTA computers.

Media label. Digital media is labeled according to section 4.2 in the scope-of-work.

Imagery file names. TIFF imagery files are named according to section 4.1 of the scope-of-work.

File formats. Imagery files are delivered as TIFF with TFW world file format and a single MrSID compressed file as described in section 4.1 of the scope-of-work.

MrSID compression. Compression is applied to the TIFF imagery to create a single file in MrSID format according to section 4.1 of the scope-of-work. Compression techniques may involve slight information loss from the original imagery. A visual check will be evaluated to ensure information loss is minimal.

Imagery files align with the SRTA orthoimagery index grid. Imagery tiles conform in shape and location to the SRTA grid as described in section 4.1 of the scope-of-work.

Digital file of ground coordinates and airborne GPS coordinates. File and metadata are delivered in Esri ArcGIS compatible format for use in ArcMap according to section 3.2.4 of the scope-of-work.

Imagery pixel size. Pixels of all imagery files are 3" GSD (0.25 feet).

Datum and projection. All imagery files are geo-referenced to the California State Plane Coordinate System, Zone I, North American Datum (NAD) 83 horizontal datum (Well Know ID WKID 2225, NAD_1983_StatePlane_California_I_FIPS_0401_Feet), and the North American Vertical Datum (NAVD) 88. All final values are in U.S. Feet according to section 2.1 of the scope-of-work.

Imagery flight date. Metadata shows that the imagery was collected before April 1, 2016 according to section 2.3.1 of the scope-of-work.

DTM/DEM. The DTM/DEM will be examined for completeness according to section 3.4.3 of the scope-of-work.

Clouds. Any individual imagery tile that has clouds or cloud shadows that appear on the imagery shall be measured to occupy less than 5% of the covered tile according to section 2.3.2 of the scope-of-work.

Smoke or dust. Imagery will be examined to evaluate if any ground area may be obscured by snow, fog, smoke or dust according to section 2.3.2 of the scope-of-work.

Imagery color bands. Imagery files will be examined to conform to the 3-band color RGB specifications described in section 3.5.2 of the scope-of-work.

Color balance and tone. The imagery files will be visually examined to evaluate acceptable tonal balance across the entire project area according to section 3.5.2 of the scope-of-work. Any change in color balance and tone across the project should be gradual and minimal.

Quality conforms to SRTA 2010 imagery collection. The overall quality of color balance, brightness, and tone across the project shall be similar or superior to the 2010 SRTA imagery

collection according to section 3.5.5 of the scope-of-work. Imagery tiles from this 2016 project will be visually compared to imagery from the 2010 collection.

Defects. The imagery files will be visually examined to evaluate if any defects affect the quality of the image. Defects would include scratches, image blemishes, debris, smears, blur, or artifacts that are introduced during the production process according to section 3.5.3 of the scope-of-work.

Gaps, missing data, or null pixels. The imagery files will be checked to assure there are no gaps between tiles, missing data, or null pixels according to section 4.1 of the scope-of-work with the exception of null pixels in the portion of tiles outside the project boundary area according to section 4.1.1 of the scope-of-work.

Radiometric distortion. The imagery files will be visually examined to evaluate any distortion or warping of bridges, overpasses, steep terrain, or other features that would not be acceptable according to section 3.5.3 of the scope-of-work.

Vertical distortion. Imagery files will be visually examined to evaluate any distortion of buildings, overpass, towers, or bridges and should be in acceptable limits according to section 3.5.3 of the scope-of-work.

Shadows. The imagery is to be collected when the sun angle is 30 degrees or more. Shadows must not be so dark that they obscure image content according to section 2.3.2 of the scope-of-work.

Edge matching and image mosaicing. The imagery tiles will be visually examined to assure the tiles meet together to form a seamless countywide imagery mosaic with no gaps or image misplacements within and between adjacent images. All imagery will be inspected for feature alignments along seamlines or between individual tiles according to section 3.5.3 of the scope-of-work.

Horizontal accuracy. Horizontal accuracy testing of submitted imagery files may be performed using ground survey location coordinates collected by a licensed surveyor employed by SRTA or one of the project partners. The imagery accuracy may be evaluated to determine horizontal accuracy according to ASPRS methodology for estimating the positional accuracy of points in digital geospatial data. Horizontal accuracy requirements are based on section 2.2 of the scope-of-work.

Metadata. Federal Geographic Data Committee (FGDC) compliant metadata that fully describe data compilation, quality and accuracy are created and checked for digital imagery products.

Image tile dimensions. The imagery grid file size is to be 6,002 (24,008 pixels) feet east-west by 4,002 feet (16,008 pixels) north-south that includes a 1-foot (4 pixel) overlap at the each edge of the imagery grid according to section 4.1 of the scope-of-work.