

REQUEST FOR QUOTATION

SOLICITATION NUMBER: USDA-NRCS-1-09

2009 NRCS DIGITAL PILOT PROJECT

Solicitation Issue Date: December 19, 2008

Quotation Due Date: January 21, 2009



U.S. DEPARTMENT OF AGRICULTURE
FARM SERVICE AGENCY
AERIAL PHOTOGRAPHY FIELD OFFICE

NOTICE TO OFFEROR

Any proposal submitted for this RFQ must be identified with the following information labeled on the outside of the mailing package:

SOL.NO: USDA-NRCS-1-09
DUE DATE: 21-JAN-2009, 4:30 PM
RECEIVING OFFICE: CONTRACTING

Mail To: AERIAL PHOTOGRAPHY FIELD OFFICE
CONTRACTING OFFICER
2222 WEST 2300 SOUTH
SALT LAKE CITY UTAH 84119-2020

NOTICE TO PROSPECTIVE OFFERORS

PLEASE NOTE THE FOLLOWING SPECIAL SOLICITATION REQUIREMENTS:

The following information **MUST** be submitted with any price quotation: Aircraft and digital sensors(s) proposed for use, incomplete contracts, technical capability statement, and past performance (See Section A, Page 2) and digital camera approval package (See Attachment B).

Multiple project areas are listed to allow offerors a variety of locations to minimize aircraft ferry costs. Awards may be made to multiple contractors in order to maximize the variety of sensors and meet the intended purpose of this pilot.

This solicitation requires direct digital camera acquisition and orthorectification services.

Quotations may be submitted by fax (801) 956-3640 on or before 4:30 pm MST January 21, 2009 to the Contracting Office.

This RFQ is subject to the Availability of Funds Clause (FAR 52.232-18).

The complete text of any or all clauses referenced herein may be obtained by submitting a request, identifying this solicitation number, to the Contracting Officer, USDA, FSA, Aerial Photography Field Office, 2222 West 2300 South, Salt Lake City, Utah 84119-2020. Complete copies of the FAR in loose-leaf or CFR form may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402.

REQUEST FOR QUOTATION (THIS IS NOT AN ORDER)		THIS RFQ <input type="checkbox"/> IS <input type="checkbox"/> IS NOT A SMALL BUSINESS SET-ASIDE		PAGE OF PAGES
1. REQUEST NO.	2. DATE ISSUED	3. REQUISITION/PURCHASE REQUEST NO.	4. CERT. FOR NAT. DEF. UNDER BDSA REG. 2 AND/OR DMS REG. 1	RATING
5a. ISSUED BY			6. DELIVER BY (Date)	
5b. FOR INFORMATION CALL (NO COLLECT CALLS)			7. DELIVERY	
NAME		TELEPHONE NUMBER		<input type="checkbox"/> FOB DESTINATION <input type="checkbox"/> OTHER (See Schedule)
		AREA CODE	NUMBER	9. DESTINATION
8. TO:			a. NAME OF CONSIGNEE	
a. NAME		b. COMPANY		b. STREET ADDRESS
c. STREET ADDRESS				c. CITY
d. CITY		e. STATE	f. ZIP CODE	d. STATE e. ZIP CODE
10. PLEASE FURNISH QUOTATIONS TO THE ISSUING OFFICE IN BLOCK 5a ON OR BEFORE CLOSE OF BUSINESS (Date)		IMPORTANT: This is a request for information, and quotations furnished are not officers. If you are unable to quote, please so indicate on this form and return it to the address in Block 5a. This request does not commit the Government to pay any costs incurred in the preparation of the submission of this quotation or to contract for supplies or service. Supplies are of domestic origin unless otherwise indicated by quoter. Any representations and/or certifications attached to this Request for Quotation must be completed by the quoter.		

11. SCHEDULE (Include applicable Federal, State and local taxes)

ITEM NO.	SUPPLIES/ SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
(a)	(b)	(c)	(d)	(e)	(f)

12. DISCOUNT FOR PROMPT PAYMENT	a. 10 CALENDAR DAYS (%)	b. 20 CALENDAR DAYS (%)	c. 30 CALENDAR DAYS (%)	d. CALENDAR DAYS	
				NUMBER	PERCENTAGE

NOTE: Additional provisions and representations are are not attached.

13. NAME AND ADDRESS OF QUOTER			14. SIGNATURE OF PERSON AUTHORIZED TO SIGN QUOTATION		15. DATE OF QUOTATION	
a. NAME OF QUOTER						
b. STREET ADDRESS						
c. COUNTY			16. SIGNER			
d. CITY			a. NAME (Type or print)		b. TELEPHONE	
					AREA CODE	
e. STATE		f. ZIP CODE	c. TITLE (Type or print)		NUMBER	

NOTE: THIS SECTION MUST ACCOMPANY ANY QUOTATION SUBMITTED.

SECTION A

REQUIRED STATEMENTS OF OFFERORS

A-1 AIRCRAFT TO BE USED IN COMPLETION OF THIS CONTRACT:			
Make/Model	Registration Number	Operating Ceiling	Offeror Owned (check appropriate block)
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
*If the aircraft is/are not offeror owned, a written statement of availability from the owner of the aircraft must be enclosed.			

A-2 CAMERA(S)/SENSOR(S) TO BE USED IN COMPLETION OF THIS CONTRACT			
Calibration Report Number	Camera Make/Model	Serial Number	Offeror Owned (check appropriate box)
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
*If the camera(s) is/are not offeror owned, a written statement of availability from the owner(s) of the camera(s) must be enclosed.			

A-3 TECHNICAL CAPABILITY STATEMENT

A detailed statement regarding the offeror’s technical capability to successfully perform this contract must be submitted with offer. Technical capability may be described in terms of planned technical approach to job, project scheduling and site basing of aircraft, camera and crew availability, company’s quality control system, personnel qualifications, and incomplete contracts.

A-4 PAST PERFORMANCE REFERENCES

If no previous contracts have been held by the offeror with the USDA Aerial Photography Field Office, list at least two (2) references, with which the offeror has held similar contracts. If possible, one reference should be within the Federal government. List company or agency name, address, name of person to contact, and telephone number.

SECTION B

PROJECT SERVICES AND REQUIREMENTS

B-1 PROJECT DESCRIPTIONS

1.1 Pilot Project

This procurement is a pilot project designed to assess the use of direct digital acquisition of aerial imagery with digital cameras/sensors. The project is intended to be acquired in concurrence with the 2009 National Resources Inventory (NRI) program and Wetlands Reserve Program (WRP) scheduled for film acquisition during the same photo periods. This will allow government analysts to determine the feasibility of digital acquisition as directly compared to the film acquisition of identical sites and areas. The requirements and specifications stated herein are an attempt to mimic as closely as possible the standard 1:7,920 scale film product with the comparable digitally acquired product. The results of this pilot project and subsequent analysis may impact the direction of future NRI and WRP procurement strategies.

1.2 Goals and Objectives

Project goals and objectives include, but are not limited to: (1) acquiring multiple resolutions of the same areas for the determination of which resolution best meets program requirements and best mimics film products; (2) award work to the widest variety of digital sensors for comparison of performance, product quality, cost, etc.; (3) acquire the widest variety of terrain types in different regions of the United States; and (4) acquire as much data as possible based on limits of project funding.

1.3 Project Areas

Project areas, which are defined as all NRI sites and/or WRP locations awarded within a single state, are listed in the table below. Multiple states may be awarded to a single contractor (each being considered a separate project area) or an individual state may be awarded to multiple contractors (with each contract having a unique project item number).

Multiple resolutions will be required for each project area(s). Refer Section B-3.3(a) for specific resolution requirements.

PROJECT AREAS: NRCS SMALL AREA DIGITAL PILOT PROJECT			
PROJECT AREAS	NRI SITES	WRP LOCATIONS	ACQUISITION PERIODS
1. ARKANSAS	31	8	Aug 1 – Sept 30, 2009
2. COLORADO	39	3	Jul 1 – Aug 15, 2009
3. FLORIDA	25	5	Mar 15 – Apr 15, 2009*
4. NEW YORK	40	5	Jul 15 – Sept 15, 2009
5. OREGON	23	9	Jun 15 – Jul 31, 2009
6. SOUTH DAKOTA	30	10	Jun 1 – Jul 31, 2009
			* Palm Beach County, FL, Apr 15 – Jun 15, 2009

1.4 National Resource Inventory (NRI) Description

USDA Natural Resources Conservation Service (NRCS) National Resources Inventory (NRI) imagery shall be used by NRCS for interpretative analysis and extraction of data on samples by means of photogrammetric measurements. The NRI sample sites are generally 160 acre square parcels measuring 0.5 mile on each side. Currently NRI sites are photographed centered on a single natural color positive aerial photograph. Within each NRI sample site, NRCS collects data on land cover and use, soil erosion, prime farmland, wetlands, and characteristics of other natural resources. The nominal photographic scale for NRI is predominately 1:7,920. The approximate photographic period is March through September. Historically, NRCS requires approximately 70,000 NRI Sites located nationwide to be acquired each year. This random sample set is derived from a larger population of approximately 300,000 NRI Sites.

1.5 Wetland Reserve Program (WRP) Description

USDA NRCS Wetland Reserve Program (WRP) is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The NRCS provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection. The WRP imagery shall be used to monitor restoration efforts. WRP sites are generally larger than NRI sites in size with some requiring flight line photography. However, some WRP sites are less than one (1) acre while others may be as large as 13,000 acres. The nominal photographic scale is 1:7,920. The approximate photographic period is March through September.

1.6 Intended Use of Product

The imagery shall be used by the Natural Resources Conservation Service (NRCS) to evaluate the use of direct digital imagery for the National Resources Inventory (NRI) and Wetland Reserve Program (WRP.) These programs collect and measure natural resource data by means of photo interpretation and geographic information systems (GIS) technologies.

1.7 Location of Work

The Contractor's place of performance where work will be performed on this contract shall be indicated in ORCA Certification.

1.8 Importance of Image Quality

Any imagery submitted to the Government that does not meet the minimum quality requirement may impact the Government's ability to properly use the imagery for its intended purpose and may be subject to a price reduction based on the diminished usability of the product.

B-2 PROGRAM CATEGORIES

The pilot project will evaluate whether direct-digital acquisition is suited for NRI and WRP programs. The requirements for the programs are similar, however, the end users have different objectives. Therefore, we have separated the two programs into "categories" for organizational purposes.

2.1 Program 1: NRI Sites

The Contractor shall acquire multiple resolutions in stereo for each NRI site in the project area awarded in accordance with the requirements listed in Section B-3, General Requirements and Section C, Description/Specifications/Work Statement.

- (a) Stereo coverage: All NRI sites require complete stereo-coverage, including the mandatory buffer. Sites that can be acquired with a single exposure due to the native sensor footprint still require stereo-coverage.
- (b) Orthorectification: For each ground sample distance (GSD) specified in B-3.3(a), Spatial Resolution, the Contractor shall use the unprocessed image(s) to create a single orthorectified image, mosaic if needed, per site. Footprint of the resulting orthorectified image needs only to be a rectangular image of the site plus mandatory buffer area.

- (c) Site Quantities: Below are the site quantities for potential project areas. The number below represents the sites to be covered, not a predetermined exposure quantity. Actual exposure quantity will be determined by the sensor footprint and the contractor's flight plan. Please note that due to funding limitations, not all states may be awarded.

PROGRAM 1: NRI SITES			
PROJECT AREAS	SITES QTY	SITE MIN ACREAGE	SITE MAX ACREAGE
ARKANSAS	31	38.6	166.7
COLORADO	39	143.6	186.1
FLORIDA	25	150.0	180.6
NEW YORK	40	71.1	108.3
OREGON	23	121.2	177.1
SOUTH DAKOTA	30	154.2	170.3

2.2 Program 2: WRP Locations

The Contractor shall acquire multiple resolutions in stereo for each NRI site in the project area awarded in accordance with the requirements listed in Section B-3, General Requirements and Section C, Description/Specifications/Work Statement.

- (a) Stereo coverage: All NRI sites require complete stereo-coverage, including the mandatory buffer. Sites that can be acquired with a single exposure due to the native sensor footprint still require stereo-coverage.
- (b) Orthorectification: For each ground sample distance (GSD) specified in B-3.3(a), Spatial Resolution, the Contractor shall use the unprocessed image(s) to create a single orthorectified image, mosaic if needed, per site. Footprint of the resulting orthorectified image needs only to be a rectangular image of the location plus mandatory buffer area.
- (c) Location Quantities: Below are the location quantities for potential project areas. The number below represents the locations to be covered, not a predetermined exposure quantity. Actual exposure quantity will be determined by the sensor footprint and the contractor's flight plan. Please note that due to funding limitations, not all states may be awarded.

PROGRAM 2: WRP LOCATIONS			
PROJECT AREAS	LOCATIONS QTY	LOCATION MIN ACREAGE	LOCATION MAX ACREAGE
ARKANSAS	8	116.0	572.0
COLORADO	3	79.6	352.5
FLORIDA	5	96.0	533.1
NEW YORK	5	40.2	216.3
OREGON	9	36.0	320.0
SOUTH DAKOTA	10	30.6	462.2

B-3 GENERAL REQUIREMENTS

The Contractor shall furnish direct digital aerial imagery services, orthorectification services, and related supplies in accordance with the requirements, specifications, terms, and conditions specified herein.

3.1 Project Flight Planning Requirement

Contractor is required to provide the necessary flight line plans, which shall include flight altitude determinations, for the acquisition of precise vertical aerial imagery in accordance with the technical requirements in Section C-3, Flight Planning.

3.2 Project Deliverables

(a) Materials To Be Delivered:

Deliverable	Data Format	Government Approval Required	Metadata Required
Project Flight Plan	Microsoft Word or PDF	Yes	No
Pre-Production Imagery Sample**	TIFF	Yes	No
4-band, georeferenced, uncompressed digital image files*	GeoTIFF	Yes	Yes
Orthoimage files (mosiacked if needed)*	GeoTIFF	Yes	Yes
ABGPS/IMU Data and supplemental GPS ground data*	ASCII text	No	Yes

Pilot Logs	Paper or PDF	No	No
Progress Reports	Fax	No	No
Photo-center File(s)*	ASCII text	Yes	Yes
RMSE*	ASCII text	No	Yes
Metadata	ASCII text	No	N/A

* **delivered on external hard drive**

** **delivered on CD-ROM or DVD**

(b) Delivery Schedule

- (1) Flight Plan: The flight plan must be submitted and approved by the Contracting Officer prior to the commencing of acquisition of the project area.
- (2) Pre-Production Sample: The Contractors shall submit a single radiometrically corrected image within 21 days of the first image acquisition for government review and approval. The Government will evaluate and provide approval or disapproval with comments no later than 3 business days, with a goal of 24 hours.
- (3) Progress Reports: A progress report is required for each day progress is made acquiring project imagery. Each progress report shall be sent via fax transmission no later than Tuesday, 12:00 (MT) of the following week of the reporting period.
- (4) Imagery & Auxillary Data: All remaining deliverables, including but not limited to digital imagery, orthos and text files, are due thirty (30) calendar days after the acquisition season end date or any authorized extension thereof.
- (5) Corrected Materials: Remake materials shall be shipped as soon as possible after correction is made but no later than 30 days after receipt in the Contractor's facility of the materials or data required to make the corrections. Only material specifically requested by USDA to be corrected shall be submitted for inspection. Signed delivery receipts will be required to verify date of receipt of such data or materials by the Contractor.

- (c) Delivery Quantities: **Two (2) complete copies** of all materials delivered on hard drives or CD-ROM/DVD shall be delivered to the Aerial Photography Field Office. Each county (NRI and WRP) shall be organized into separate directories on each media delivered. See Exhibit 3, File Naming Convention and Directory Structure.

3.3 Technical Requirements

- (a) Spatial Resolution: Three GSD resolutions are required for each site/location 30cm (12-inch), 15cm (6-inch) and 8cm (3-inches).
- (b) Radiometric Resolution: All imagery shall be collected at a minimum of 12-bits per band.

- (c) Acquisition Period: Approximately March 15, 2009 through September 30, 2009. See B-1.3, Project Areas for specific project area acquisition periods.
- (d) Minimum Sun Angle: 45 Degrees
- (d) Buffer Requirement: All sites/locations require complete stereo coverage, including a buffer of 400 (± 40) meters in all cardinal directions.
- (e) Absolute Horizontal Accuracy: All image tiles shall have 95% of well-defined points tested fall within 4.0 meters of true ground.
- (f) Metadata File(s): Metadata files submitted with all digital imagery shall meet Federal Geospatial Data Center (FCGC) requirements as to form and content.
- (g) Naming Convention Data: The government will provide the naming convention to be used for each site and location. This will mimic the naming convention for existing film contract(s). See Exhibit 3, File Naming Convention and Directory Structure.
- (h) Project Maps: See Exhibit 1, Project Maps.

3.4 Direct Digital Sensor Acquisition

The direct-digital imagery acquisition requirements shall be for the collection of visible (Red, Green, Blue) and color near infrared (IR) imagery. The digital sensor system shall be a tested, stable, geometrically calibrated system with appropriate documentation, suitable for use in precision photogrammetric orthoimagery applications.

- (a) Digital sensor acquisitions require the Contractor to comply with the technical requirements and specifications of this contract and Attachment A, Direct-Digital Camera Specification for 2009 NRCS Digital Pilot Project, which defines the essential elements in securing high quality direct digital imagery.
- (b) The Contractor is required to provide a detailed technical description and sample image of the digital camera/sensor being proposed for use. See Attachment A.
- (c) The digital sensor system shall have the appropriate image resolving power and field of view required to provide the GSD. The proposed direct digital sensor system shall have the capacity and the through-put necessary to acquire complete project item quantities in accordance with delivery schedules as indicated herein.

B-4 Government Furnished Property:

The Government shall only furnish the following listed item(s) of property to the Contractor:

4.1 Coverage Shapefiles of Categories

- (a) NRI Coverage: One (1) ESRI® compatible shapefile(s) containing the site boundary to be acquired. This shapefile does NOT include the mandatory buffer. Before release of the data containing the exact site locations, offerors must return a signed non-disclosure statement. (See Exhibit 6, Non-Disclosure Agreement and Section B-5.6 Confidentiality Statement.)
- (b) WRP Coverage: One (1) ESRI® compatible shapefile(s) containing the location boundary to be acquired. This shapefile does NOT include the mandatory buffer.

4.2 Metadata Template

Two (2) ASCII text files will be provided to be used as templates when creating the metadata for the georeferenced image tiles and the orthorectified image tiles. See Section C-6.1, Georeferenced, Uncompressed Digital Image Tiles, and 6.2, Orthorectified Image Tiles.

B-5 ADMINISTRATIVE REQUIREMENTS

- 5.1 Photographic Season Extension: The Government reserves the right to extend the photographic season of this contract beyond the approximate photographic period indicated in Paragraph B-1.3, Project Areas. A lower minimum sun angle requirement may be necessary to allow the season extension. The Government may extend the season of this contract, at no increase in price, by written notice to the contractor at any time prior to the end of the photographic season. (Refer to FAR 52.217-08 "Option to Extend Services".)

5.2 Ownership of Photographic Materials

All original photographic materials shall become the property of the Government upon formal acceptance. No reproductions shall be made prior to inspection by the Government unless specified in the contract or authorized by the Contracting Officer.

5.3 Wage Determination

The Wage Determination applicable to any contract resulting from this solicitation is determined by the location of the Contractor's establishment. Wage Determination Number 1995-0222, Revision 23, Dated February 2, 2008, will be applicable for contractors nationwide. (See Exhibit 9, Wage Determination.)

5.4 Industry Small Business Standard

The small business industry size standard for the type of services covered by this procurement, under NAICS code 541922, is the average annual receipts of the concern and its affiliates for the preceding three (3) years not in excess of \$7.0 million.

5.5 Invoices

Contractor invoices shall be submitted in an original and two copies to the Contracting Officer designated in this contract or on the delivery order to receive invoices. To constitute a proper invoice, the invoice must include the following information and/or attached documentation:

- (1) Name of the business concern and invoice date.
- (2) Contract number, or other authorization for delivery of property or services.
- (3) Description, price, and quantity of services actually delivered or rendered.
- (4) Shipping and payment terms.
- (5) Name (where practicable), title, phone number, and complete mailing address of responsible official to whom payment is to be sent.

Notice of an apparent error, defect, or impropriety in an invoice will be given to the Contractor within 7 days of receipt of an invoice and suitably documented.

5.6 Confidentiality Statement

It is USDA policy that site locations of the NRI are “for official use only” and shall remain confidential. Site locations, represented in either hardcopy or digital form, are available exclusively for use by Government authorized personnel conducting resource inventory activities or other authorized use. Before release of exact site locations, offerors must agree to, by signature, the non-disclosure statements contained in Exhibit 7 and be submitted with the RFQ offer. This applies ONLY to the NRI Sites, there are no such restrictions on the WRP data.

5.7 Non-Discrimination Statement

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its program and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual’s income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of Discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW., Washington, DC 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

5.8 Availability of Funds (FAR 52.232-18, APR 1984)

Funds are not presently available for this contract. The Government’s obligation under this contract is contingent upon the availability of appropriated funds from which payment for contract purposes can be made. No legal liability on the part of the Government for any

payment may arise until funds are made available to the Contracting Officer for this contract and until the Contractor receives notice of such availability, to be confirmed in writing by the Contracting Officer.

B-6 INSTRUCTIONS AND EVALUATIONS OFFERS

6.1 Instructions to Offerors

Offerors shall prepare their offer(s) in accordance with the following instructions:

- (a) Pricing: Pricing shall be prepared separately for each State project requirements using the Pricing Worksheets provided in Exhibit 2. Separate pricing for each program, NRI by site and WRP by acres, shall be provided. The final total cost for each state project shall then be summarized on the standard form SF-18. Each state project offered shall be listed as a separate line item on the SF-18 and identified by state, quantity as “1”, unit as “job”, and “unit price” and “amount” as the same total price for that project. One or more states can be listed as line items on the same SF-18.
- (b) Aircraft: Aircraft to be used in completion of this project shall be listed in Section A by make/model, registration number, operating ceiling, and whether or not owned.
- (c) Cameras or Sensors: Cameras or sensors to be used in completion of this project shall be listed in Section A by calibration report number, camera make/model, serial number, and whether or not owned.
- (d) Technical Capability: A detailed statement regarding the offeror’s technical capability to successfully perform this contract must be submitted with offer. Technical capability may be described in terms of planned technical approach to job, project scheduling and site basing of aircraft, camera and crew availability, company’s quality control system, personnel qualifications, and incomplete contracts.
- (e) Past Performance: Records from previous contracts shall be used to determine past performance score. If no previous contracts have been held by the offeror with the USDA Aerial Photography Field Office, list at least two (2) references, with which the offeror has held similar contracts. If possible, one reference should be within the Federal government. List company or agency name, address, name of person to contact, and telephone number.

6.2 Evaluation of Offers

- (a) Evaluation Criteria: Offers shall be evaluated according to the following criteria including all supporting information furnished by the offeror with their quotation. The following evaluation criteria are listed in descending order of importance. Technical

capability and past performance, when combined, are more important when compared to price.

- (1) Price: Completed SF-18 and pricing worksheets. In the event of a mathematical error, the unit price takes precedence over the extended total price.
 - (2) Technical Capability: Completed Section A and summary statements describing the planned technical approach to job, project scheduling and site basing of aircraft, camera and crew availability, company's quality control system, personnel qualifications, and incomplete contracts.
 - (3) Past Performance: Past performance record of similar projects or references.
- (b) The Government reserves the right to make an award to other than the lowest priced offeror, or other than the highest technically rated offeror, when the perceived benefits and tradeoffs provide the Government the greatest value in meeting the goals and objectives of this pilot project.
- (c) The Government will award a contract, or multiple contracts, resulting from this solicitation to that responsive and responsible offeror(s) whose offer represents the greatest value and is determined to be in the best interest and the most advantageous to the Government, price and other factors considered.

SECTION C

DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

C-1 SCOPE OF CONTRACT

The general scope of the contract is to procure precise vertical aerial imagery for one or more of the following purposes: natural resource inventory, stereomodel compilation, analytical aerotriangulation, orthophotography, and extraction of data by means of photogrammetric measurements.

1.1 Introduction

The Contractor is responsible for furnishing direct digital imagery and related services and supplies in accordance with requirements, specifications, terms and conditions specified herein.

- (a) Technical Requirements and Specifications: The technical requirements and specifications of this contract are described in **Section C** which define the essential elements in securing high quality aerial imagery. Any deviation from the specifications stated herein may cause increased time and effort in using the photography as intended.
- (b) Delivery and Performance: All contract materials shall be shipped within the time limits and to the place of delivery specified on the resulting delivery/purchase order. Performance of the contract shall be authorized and monitored by the Contracting Officer and/or the Contracting Officer's Representative.
- (c) Quality Control: Quality control shall be exercised by the Contractor continuously throughout the performance of the contract. Procedures shall be established to assure that all aerial imagery are delivered in accordance with the delivery schedule and at the required level of accuracy and quality. The Contractor shall acquire immediate reflights of any photography where coverage or image quality fails to meet minimum requirements of the contract specifications.
- (d) Contract Material Inspection: All materials specified in Section B-3.2, Project Deliverables, will be inspected to determine conformance to all contract requirements and specifications. Inspections shall be performed at the APFO facility in Salt Lake City, Utah. If inspection of materials reveal marginal deficiencies, a review by the user agency may be performed to determine if deficiencies may cause increased time and effort in using the imagery as intended. If any of the services do not conform to the contract requirements, the Government may require the contractor to perform the services again in conformity with contract requirements, at no increase in contract amount. When the defects in services cannot be corrected by re-performance, the Government may:

- (1) Require the Contractor to take necessary action to ensure that future performance conforms to contract requirements and
- (2) Reduce the contract price to reflect the reduced value of services performed.

The Government will make every effort to inspect all material specified within 30 calendar days after they are received at the point designated. Should the inspection procedure be delayed longer than 30 days, the Contractor will be notified on the reason(s) for delay and given the estimated completion date. Contract materials will be inspected in the order of their receipt, unless otherwise prioritized by the Government.

1.2 Labor and Materials

The Contractor shall furnish all materials, equipment, transportation, superintendence, and labor as required to plan, acquire, manage, process, and orthorectify digital imagery for the project items as specified in Section B, Project Services and Requirements.

1.3 Attachments

The following documents attached to this solicitation document are considered requirements and specifications under the resulting contract(s), as applicable to the Contractor's technical proposal:

- (a) Direct-Digital Camera Specifications for 2009 NRCS Digital Pilot Project, dated December 19, 2008 (Attachment A).
- (b) USDA Direct-Digital Small Area Orthoimagery Tile Specification, dated December 19, 2008 (Attachment B).

1.4 References

The following documents referenced in this solicitation document are considered requirements and specifications under the resulting contract(s), as applicable to the Contractor's technical proposal:

- (a) Federal Geographic Data Committee (FGDC) Specification, FGDC-STD-001-1998 ("Content Standard for Digital Geospatial Metadata").
- (b) Code of Federal Regulation (CFR) Title 14 ("Federal Aviation Regulations").
- (c) GeoTIFF Revision 1.0 Specification, dated December 28, 2000 (Version 1.8.2).
- (d) TIFF Specification Revision 6 dated June 3, 1992 (Adobe Systems Inc.).

C-2 EQUIPMENT REQUIREMENTS

Any key acquisition equipment such as aircraft and digital sensors (in addition to those submitted at the time of offer) proposed to be used by the Contractor must be approved for use by the Contracting Officer. If the key acquisition equipment proposed for use are not owned by the Contractor, a written statement of availability from the owner of the equipment shall be furnished to the Contracting Officer.

2.1 Precision Aerial Mapping Digital Sensor

Digital sensors used for acquiring aerial imagery shall meet contract specifications (see Attachment A). Digital sensors must be compatible with precision stereoscopic mapping instruments and with analytical mensuration procedures used in photogrammetric surveys and in preparing accurate orthoimagery.

- (a) Digital Sensor Evaluation: Proposed digital sensor systems will be evaluated to determine if they meet the contract specifications, based on current technical descriptions and samples. The Contracting Officer shall have the right to require the removal of a camera/sensor from use when deficiencies in imagery attributable to the camera are found to exist. Any camera/sensor removed from use by the Contracting Officer shall not be returned to use on any APFO contracts until the cause of the malfunction is corrected to the satisfaction of the Contracting Officer. That determination will be based on acceptable samples, calibration reports, and/or an additional test by the Optical Science Laboratory of the USGS, if directed by the Contracting Officer.
- (b) Digital Sensor Operation: The digital sensor and its mount shall be checked for proper installation prior to each mission. In conformance with conventional photogrammetric practice, it is the preference of the Government that the Contractor use digital sensor configurations, that when installed in the aircraft, advances imagery parallel to the line of flight.
- (c) Accessories:
 - (1) Automatic Exposure Control. An automatic exposure control device is permitted, but a manual override capability is required for some types of terrain to achieve proper exposure.
 - (2) Camera Mount. The camera mount shall be regularly serviced and maintained and shall be insulated against aircraft vibration.
 - (3) Camera Port Glass. Aircraft camera port glass shall be preferably 50mm thick but not less than 32mm thick. The surface finish shall be 80/50 or better. Glass material shall be polished crown, group category M, Mil Specs Mil-W-1366F (ASG), dated October 1975, C-1 optical quality or better.

2.2 Aircraft Requirements

- (a) FAA Certification: All aircraft used in the performance of the work under this contract shall be maintained and operated in accordance with all regulations required by the U.S. Department of Transportation, Federal Aviation Administration (FAA). Aircraft operated in the acquisition of digital imagery under this contract shall be FAA certified to a service ceiling with operating load (crew, camera, oxygen, and other required equipment) of not less than the highest altitude required.
- (b) Positive Control Airspace: The proposed project item areas may contain areas of controlled or restricted airspace. It is the responsibility of the Contractor to obtain all approvals and permits necessary to assure that required clearances are achieved. When the flight plan and location of any project item coverage fall within positive-control airspace, the aircraft must contain the appropriate equipment to operate in such positive-control areas within the purview of the Federal Aviation Regulations.
- (c) Aircraft Configuration: The design of the aircraft shall be such that when the camera is mounted with all its parts within the outer structure, an unobstructed field of view is obtained. The field of view shall be shielded from the exhaust gases, oil, effluence, and air turbulence. The camera port glass shall be free of scratches and of such quality that it will not degrade the resolution or the accuracy of the camera and shall conform to Section C-2.1(c)(3), Camera Port Glass.
- (d) Airborne Global Positioning System: The aircraft shall have an Airborne Global Positioning System (ABGPS), Inertial Measurement Unit (IMU) system capable of generating accurate control points used in the creation of the photo-center data file (see C-6.5, Photo-Center Data File) and orthorectified image tiles (see Section C-6.2, Orthrectified Image Tiles).

C-3 FLIGHT PLAN REQUIREMENTS

The Contractor shall create a flight plan to be submitted to the Contracting Officer for Government approval prior to commencing acquisition of the project area(s). Due to the unique footprint of digital sensors the Contractor is responsible for the complete acquisition of the site/location area within the shapefile(s) area, plus the mandatory buffer.

The flight plan shall provide flight line planning necessary to acquire precision, high quality, stereo imagery which shall include at a minimum, exposure stations, flight altitude determinations and overlap stereoscopic coverage. The boundaries and exact coverage of this project item is determined by the official boundary shapefiles. See Section B-4.1, Coverage Shapefile.

C-4 IMAGERY ACQUISITION REQUIREMENTS

4.1 Photographic Conditions

Imagery shall be acquired when skies are clear, free from smoke, clouds, cloud shadows, excessive haze, and well-defined images can be resolved. The ground shall be free from snow below timberline, standing water (other than natural or man-made ponds and lakes), flood waters from streams which have overflowed their banks, and wet ground which obscures field, soil or crop lines. The Contractor shall minimize specular reflections by patching the area using imagery from other frames.

4.2 Flight Requirements

The Contractor shall obtain precise vertical digital imagery, and stereo-coverage, in accordance with the following technical requirements:

- (a) Acquisition Periods: The Contractor shall acquire imagery only during that portion of the day when the sun angle exceeds the requirement stated in B-3.3(d), Minimum Sun Angle. The Contractor shall limit operations to the dates specified in Section B-1.3, Project Areas or as otherwise provided in writing by the Contracting Officer.
- (b) Terrain Conditions: Ground cover is a mix of forest and cropland. Digital Imagery must be acquired when neither snow nor flooding obscures the ground.
- (c) Project Area Coverage: The Contractor is required to obtain complete coverage of the project area(s), including a minimum 400 (± 40) meter buffer in all cardinal directions. If any location requires multiple exposures to provide complete coverage, including the required buffer, then imagery must be acquired in stereo coverage for that location.
- (d) Overlap: The Contractor shall provide stereo coverage within the acceptable range of overlap as stated in the table below. Endlap (overlap in the line of the flight) and sidelap (overlap between adjacent flights) shall be expressed in percentages of total footprint area.

	Optimum	Minimum	Maximum
Endlap	62%	57%	67%
Sidelap	30%	15%	45%

- (e) Crab: For stereo coverage, in a series of two or more imageries crabled in excess of five degrees (5°), as measured between images in line and between adjoining lines, may cause rejection of any or all of the particular location.
- (f) Tilt: It is desired that exposures be made when the optical axis of the digital sensor is in a vertical position. The Contractor shall not acquire imagery when the tilt (departure from the vertical) of any exposure exceeding four degrees (4°) or relative tilt between any two successive exposures exceeding six degrees (6°). Tilt shall not average more

than 2 degrees (2°) in any 16 km (10 mile) section of a flight line and shall not average more than 1 degree (1°) for the entire project.

- (g) Control Points: The Contractor shall be responsible for acquiring or generating any ground control points necessary to meet the horizontal accuracy requirement of the imagery, that are not provided as Government Furnished Property.

4.3 Priorities of Project Areas

The Contracting Officer may direct by written order certain locations and/or resolutions to be acquired in a priority order, weather and ground conditions permitting. All reasonable efforts will be directed toward providing a schedule of operations favorable to both the Government and Contractor.

C-6 DIGITAL IMAGERY PROCESSING

6.1 Georeferenced, Uncompressed Digital Image Tiles

Contractor shall provide single point georeferenced, uncorrected digital image tiles, stereo coverage at the resolution in accordance with Section B-3.3(a), Spatial Resolution. The image shall be submitted in the native camera footprint. Tile sizes for non-frame based cameras will be mutually agreed upon by the Government and the Contractor.

- (a) Image Quality. The Contractor shall not make any radiometric adjustments to the individual image tiles. For example, if an image was acquired with a 12-bit sensor, no histogram adjustments are to be applied.
- (b) File Format. The 4-band imagery shall be 16-bit per band in accordance with the Adobe TIFF and GeoTIFF Specifications.
- (c) Auxillary Files: For each digital image tile shall be accompanied by an “.aux” file compatible with ESRI ArcMap 9.2.
- (d) Georeferenced Accuracy: The principal point shall have an accuracy of no more than 5.0 meters of true ground. All images shall be oriented so that the direction of North is towards the top of the computer display.
- (e) Tile Naming Convention: The contractor shall name the files according to the template provided in Exhibit 3, File Naming Convention and Directory Structure.
- (f) Media Requirements: All georeferenced imagery shall be delivered on external computer hard drives defined in Section C-9, Media Requirements. The files shall be named and stored in a single subdirectory under the appropriate county directory called “geo.” See Exhibit 3, File Naming Convention and Directory Structure.

- (g) Metadata: The Contractor shall create a FGDC compliant, per the FGDC-STD-001-1998 specification, metadata file using the government provided template for tile generated. The metadata must parse cleanly through the USGS metadata parser “mp” version 2.8.10 without any errors. The metadata file shall contain the same file name as the tile but with “.met” extension.

6.2 Orthorectified Image Tiles

The Contractor shall provide ortho-rectification services to produce orthorectified image tiles, mosaicked if needed, using the unprocessed imagery files created in Section C-6.1, Georeferenced, Uncompressed Digital Files. The tile shall cover the entire site/location boundary plus the mandatory buffer on all sides and shall be projected in the 1983 North American Datum (NAD83), using the corresponding Universal Transverse Mercator (UTM) native zone in meters.

- (a) Image Quality. All tiles shall meet the image quality requirements specified in Attachment B. The tile shall not contain any borders, artifacts, or other non-image items.
- (b) File Format. The digital image shall be a georeferenced tagged image file format (GeoTIFF) created in accordance with Attachment B.
- (c) Image Source. The Contractor may use imagery from multiple exposures, i.e., using the “sweet spot” from a preceding or succeeding image, when creating the tile images. Using “chips” (imagery pieces from other frames) to correct defects is also permitted. All exposures shall be from the same type of sensor and must be from same acquisition season.
- (d) Preproduction Sample. The Contractor shall submit a single radiometrically corrected image for Government approval. The sample shall be a TIFF (GeoTIFF preferred), and submitted on a standard CD or DVD. The Government will evaluate and provide approval or disapproval letter with comments. Additional project item area samples may be submitted for review if approved by the Contracting Officer Representative (COR).
- (e) Media Requirements: All orthoimage tiles shall be delivered on external computer hard drives as defined in Section C-9, Media Requirements. The files shall be stored in a single subdirectory under the appropriate county directory called “ortho”. See Exhibit 3, File Naming Convention and Directory Structure
- (f) File Naming Convention: The contractor shall name the files according to the template provided in Exhibit 3, File Naming Convention and Directory Structure.
- (g) Metadata: The Contractor shall create a FGDC compliant, per the FGDC-STD-001-1998 specification, metadata file using the government provided template for tile

generated. The metadata must parse cleanly through the USGS metadata parser “mp” version 2.8.10 without any errors. The metadata file shall contain the same file name as the tile but with “.met” extension.

6.3 ABGPS/IMU Data Files

The Contractor shall post-process IMU/GPS data collected. The Contractor shall submit both the raw and processed data. The processed data shall be projected in NAD 83, using the corresponding UTM native zone in meters, and be compatible with Leica Photogrammetry Suite (LPS).

- (a) Media Requirements: Both the unprocessed and process ABGPS/IMU data files shall be delivered on external computer hard drives as defined in Section C-9, Media Requirements. The files shall be stored in a single subdirectory under the appropriate county directory called “gps.” Unprocessed data may be stored in a separate subdirectory. A duplicate copy of the data is required if the data is common amongst counties or project areas.
- (b) File Naming Convention: The contractor shall name the files in mutually agreeable convention.
- (c) Metadata: The Contractor shall create a FGDC compliant, per the FGDC-STD-001-1998 specification. The metadata must parse cleanly through the USGS metadata parser “mp” version 2.8.10 without any errors. The metadata file shall contain the same file name as the tile but with “.met” extension. A metadata template will NOT be provided by the Government.

6.4 Supplemental GPS Ground Data

Differentially corrected GPS ground data, often referred to as “base station data”, used to supplement the Airborne GPS positional data adjustment shall be delivered in a non-proprietary format mutually agreeable to the Government and Contractor.

- (a) Media Requirements: Both the unprocessed and process ABGPS/IMU data files shall be delivered on external computer hard drives as defined in Section C-9, Media Requirements. The files shall be stored in a single subdirectory under the each county directory called “gps.” Supplemental GPS data may be stored in a separate subdirectory. A duplicate copy of the data is required if the data is common amongst counties or project areas.
- (b) File Naming Convention: The contractor shall name the files in mutually agreeable convention.

- (c) **Metadata:** The Contractor shall create a FGDC compliant, per the FGDC-STD-001-1998 specification. The metadata must parse cleanly through the USGS metadata parser “mp” version 2.8.10 without any errors. The metadata file shall contain the same file name as the tile but with “.met” extension. A metadata template will NOT be provided by the Government.

6.5 Photo-Center File

Contractor shall prepare a digital photo-center data file for each hard drive of digital imagery delivered under this contract and shall include FGDC compliant metadata support file.

- (a) **File Format:** The file(s) shall be provided in ASCII comma delimited text format. A comma delineated header file shall proceed the data in each file as shown in the example. The latitude / longitude coordinates shall be expressed in Decimal Degrees, formatted to NAD83 datum, and be accurate within 5 meters (16.4 feet) of the true photo center location. The photo-center data shall include the following attributes:

<u>DESCRIPTION</u>	<u>MAX NUMBER OF CHARACTERS IN FIELD</u>	<u>HEADER NAME</u>
Location Identification No.	14	IdNum
State	2	State
Exposure Number*	2	ExpNum
Date of Exposure (YYYYMMDD)	8	ExpDate
Time of Exposure – Local 24 Hour Clock (HHMMSS)	6	ExpTime
Sensor Serial Number **	15	Sensor
Latitude (DD.DDDDDD)	9	Lat
Longitude (-DDD.DDDDDD (Negative))	11	Lon
Flight Altitude in meters at camera (MMMMM.MM; MSL)	8	FltAlt
Number of GPS Satellites Acquired	2	GPSNum
Position Dilution of Precision (PDOP)	3	PDOP
IMU omega value (Radians)	10	Omega
IMU phi value (Radians)	10	Phi
IMU kappa value (Radians)	10	Kappa

*Same image numbers used for file naming convention.

**If digital camera has more than one sensor head please use the camera serial number.

Example:

IdNum,State,ExpNum,ExpDate,ExpTime,Sensor,Lat,Lon,FltAlt,GPSNum,PDOP,Omega,Phi,Kappa
01001-020401R,FL,1,20080827,130755,12345678,42.719326,-110.413498,7048.63,5,1.5,.0001358,.01073000,-.8732658

- (a) Media Requirements: All project data files shall be delivered on external computer hard drives as defined in Section C-9, Media Requirements. The files shall be stored in the appropriate county directory called “project”. A duplicate copy of the data is required if the data is common amongst counties or project areas.
- (b) File Naming Convention: The contractor shall name the files according to the template provided in Exhibit 3, File Naming Convention and Directory Structure.
- (c) Metadata: The Contractor shall create a FGDC compliant, per the FGDC-STD-001-1998 specification. The metadata must parse cleanly through the USGS metadata parser “mp” version 2.8.10 without any errors. The metadata file shall contain the same file name as the tile but with “.met” extension. A metadata template will NOT be provided by the Government.

6.6 Regional Settings

All digital files, including imagery and metadata, shall be created using standard ANSI English-US setting. For example, periods (ACII 46) shall be used to separate the whole number from the fractional portion when recording decimal numbers and data representing a long date shall be recorded as “Wednesday, August 17, 2005 5:09:38 PM.”

C-7 PROJECT MANAGEMENT

The Contractor shall establish and maintain a project management system with a designated project manager for this effort. Project management consists of those activities required to plan, manage, administer, and control efforts to accomplish the objective of the contract. The project manager will serve as the primary point of contact for the Contractor’s activity with the Government. The project manager’s name and contact information shall be identified, in writing, to the Contracting Officer within 21 calendar days of contract award.

7.1 Progress Reports

A Progress Report is required via fax for each performance period imagery is acquired. See Exhibit 4, Progress Report for instructions and form.

7.2 Flight Logs

The Contractor shall maintain daily flight logs for all acquisition missions. As a minimum, flight logs should record date of flight, tail number, camera serial number and for each flight line information should include: line number, start and stop time (with indicated time zone), direction, altitude, speed, and number of exposures.

7.3 Data Management

The Contractor shall keep a copy of all data, including but not limited to the unprocessed data, until formal written acceptance has been received from the Government. Contractor shall dispose of all official data in accordance with Exhibit 7, paragraph “Return of Materials”.

7.4 Subcontract Management

If the Contractor uses subcontractors in the performance of the contract, a plan and procedure will be established to manage its subcontractors. Contractor should give prior notification of any subcontracts to the Contracting Officer. The Contractor is encouraged to maximize its use of partnerships and subcontractors to accomplish the requirements of this contract. However, the Contractor is solely responsible for the performance and cost control of its partnerships and subcontractors.

C-8 QUALITY CONTROL

Quality control shall be exercised by the Contractor continuously throughout the performance of the contract. Procedures shall be established to assure that all contract materials are delivered in accordance with the delivery schedule and at the required level of accuracy and quality. The Contractor shall inspect and constantly monitor the image quality and coverage, and shall undertake immediate reflights of any imagery where the quality fails to meet minimum requirements of the contract specifications. Any marginal photography/imagery submitted for inspection which does not meet minimum requirements may be rejected. The marginal photography may be accepted, at the Government’s convenience, but shall be subject to a price reduction based on the diminished usability of the product. The nature and urgency of this project may require the Government to make equitable financial adjustments for materials deemed rejectable or where product use is adversely impacted. USDA inspection and acceptance procedures are described in Section E, Inspection and Acceptance.

8.1 Accuracy and Quality Control Report

The Contractor shall provide RMSE accuracy reports and quality control reports generated during the AT or orthorectification processes for all orthorectified images.

- (a) Media Requirements: All project data files shall be delivered on external computer hard drives as defined in Section C-9, Media Requirements. The files shall be stored in the same subdirectory as the orthorectified image tiles. See paragraph 6.2. Orthorectified Image Tiles. A duplicate copy of the data is required if the data is common amongst counties or project areas.

- (b) File Naming Convention: The contractor shall name the files in mutually agreeable convention.
- (c) Metadata: The Contractor shall create a FGDC compliant, per the FGDC-STD-001-1998 specification. The metadata must parse cleanly through the USGS metadata parser “mp” version 2.8.10 without any errors. The metadata file shall contain the same file name as the tile but with “.met” extension. A metadata template will NOT be provided by the Government.

C-9 MEDIA REQUIREMENTS

- 9.1 External Hard Drives: The delivery media for the image and metadata files shall be external combo USB2.0/IEEE1394 (Firewire) hard drives. All external hard drives shall be “Combo” style drives, capable of both USB2.0 and IEEE-1394 (Firewire) connections. The drives shall be formatted using Microsoft’s NTFS file system. The drives shall become property of the Government and will not be returned to the Contractor. Each drive shall have a label attached directly to the drive identifying the project contained on the drive in accordance with Exhibit 6, Hard Drive Label Labeling Requirement.
- 9.2 Compact Disks (CD-ROMs): All compact disks (CDs) shall be delivered on archival media, 700 Megabytes (80-minute) per disk CD-R, ISO 9660 Mode 1 format using level 2 interchange. The contractor must insure that each and every copy session has been properly closed. No multi-session enabled CDs shall be acceptable. All CD media shall be packaged in standard single CD jewel cases (5-5/8” x 4-15/16” x 3/8”) with a clear front cover. The CD label should be readable without opening the case or removing the CD from the case. “Slim” or other nonstandard sized jewel cases will not be accepted.
- 9.3 Digital Versatile Disks (DVDs): Digital Versatile Disk. All digital versatile disks (DVDs) shall be delivered on archival media, single-sided, 4.7 Gigabyte (120-minutes) DVD-R discs. Other DVD formats, such as DVD-R(A), DVD-RW, DVD+R, or DVD+RW, will not be accepted. DVDs shall meet all other requirements, except for the media type, as specified for CDs (see paragraph above).

LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS

<u>Exhibit</u>	<u>Description</u>	<u>Page</u>
Exhibit 1	Project Maps (6 pages).....	27-32
Exhibit 2	Pricing Worksheets (3 pages)	33-35
Exhibit 3	File Naming Conventions& Directory Structures	36
Exhibit 4	Progress Reports	37
Exhibit 5	Hard Drive Labeling Requirement.....	38
Exhibit 6	Non-Disclosure and Confidentiality Agreement (2 pages).....	39-40
Exhibit 7	Wage Determination (5 pages)	41-45
	Nationwide: Number 1995-0222, Revision 23, Dated February 6, 2008	

Attachment A Direct-Digital Camera Specification for 2009 NRCS Digital Pilot Project

Attachment B USDA Direct-Digital Small Area Orthoimagery Tile Specification

EXHIBIT 1

PROJECT AREA MAPS

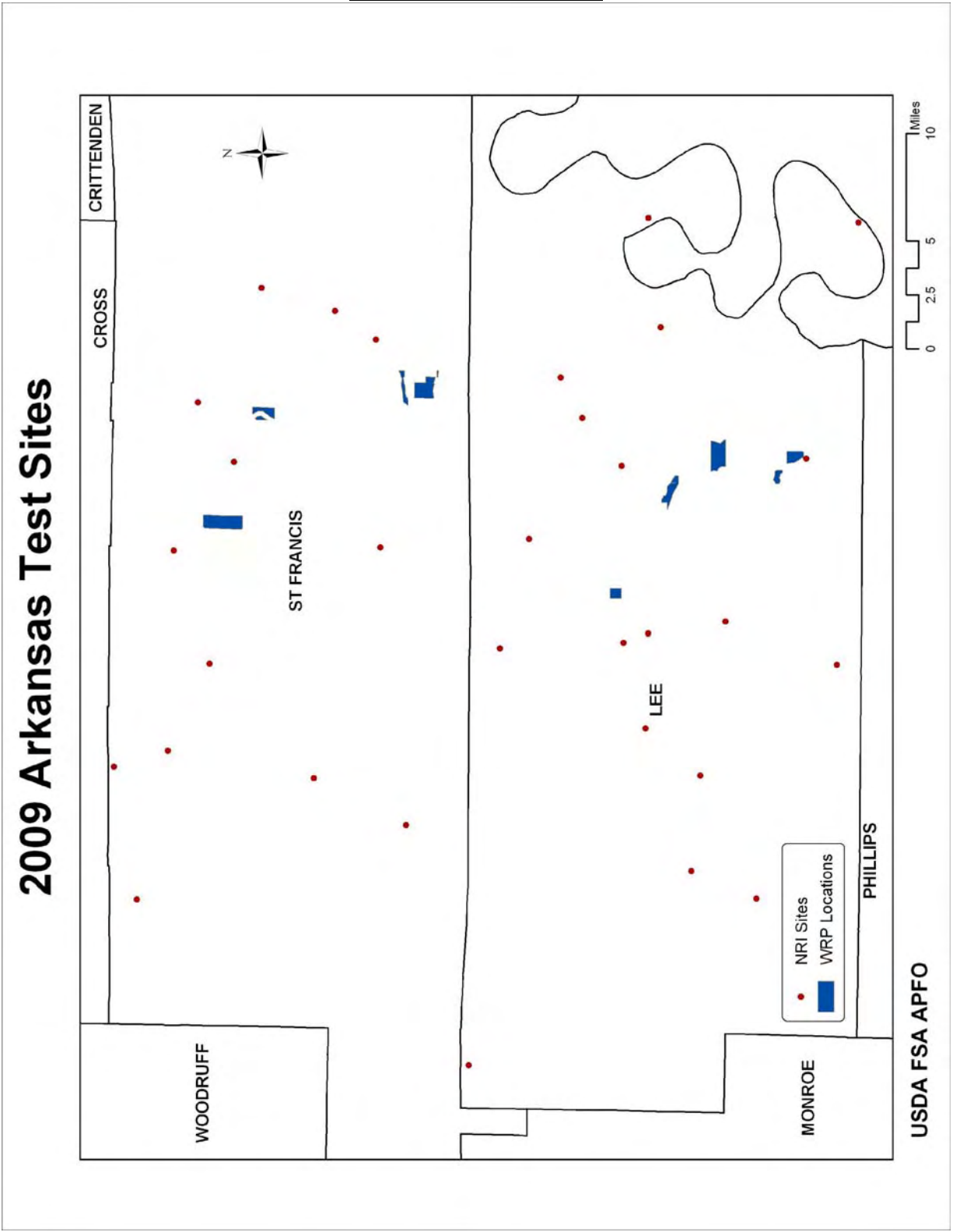
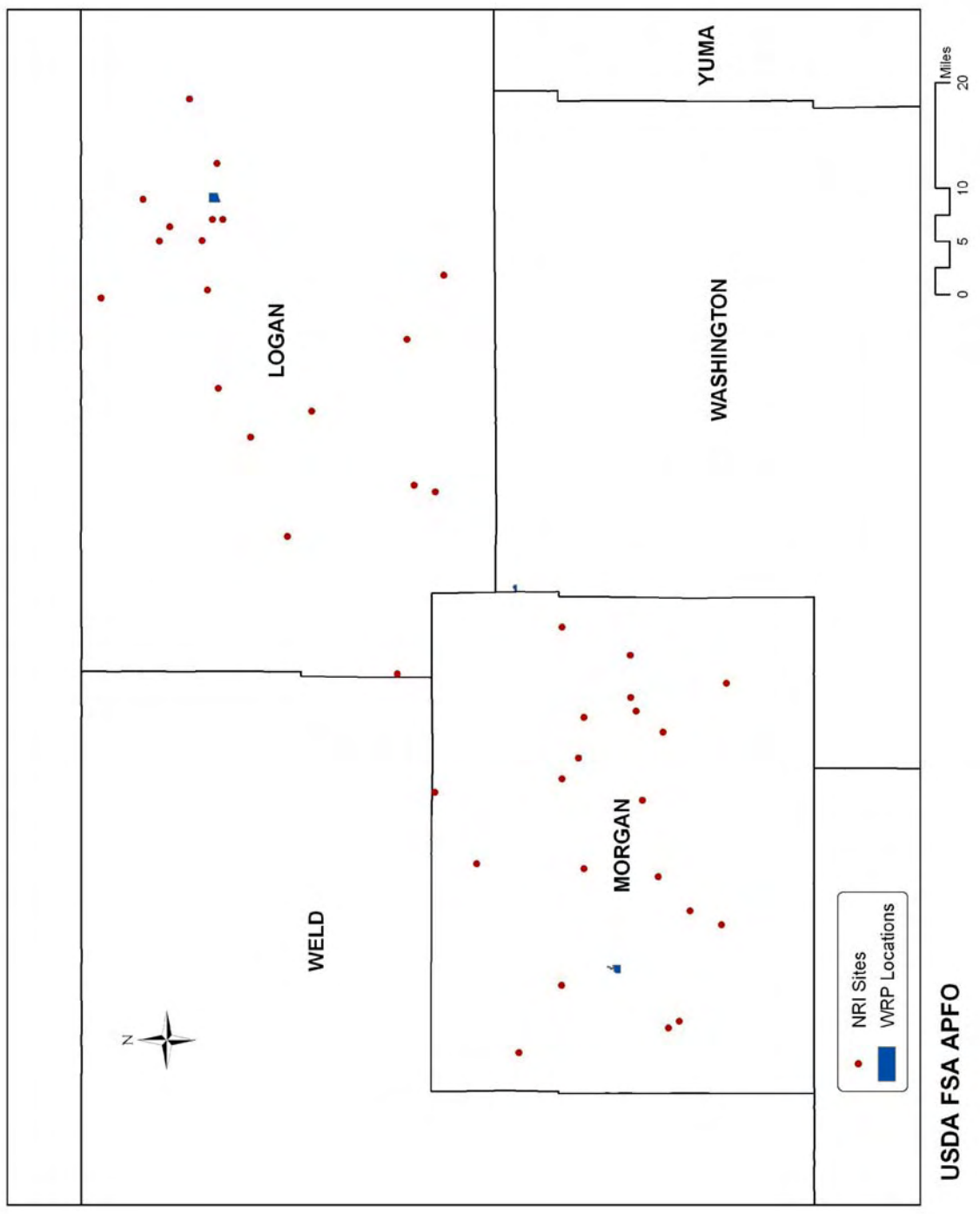


EXHIBIT 1

PROJECT AREA MAPS, (Con't)

2009 Colorado Test Sites



USDA FSA APFO

EXHIBIT 1

PROJECT AREA MAPS, (Con't)

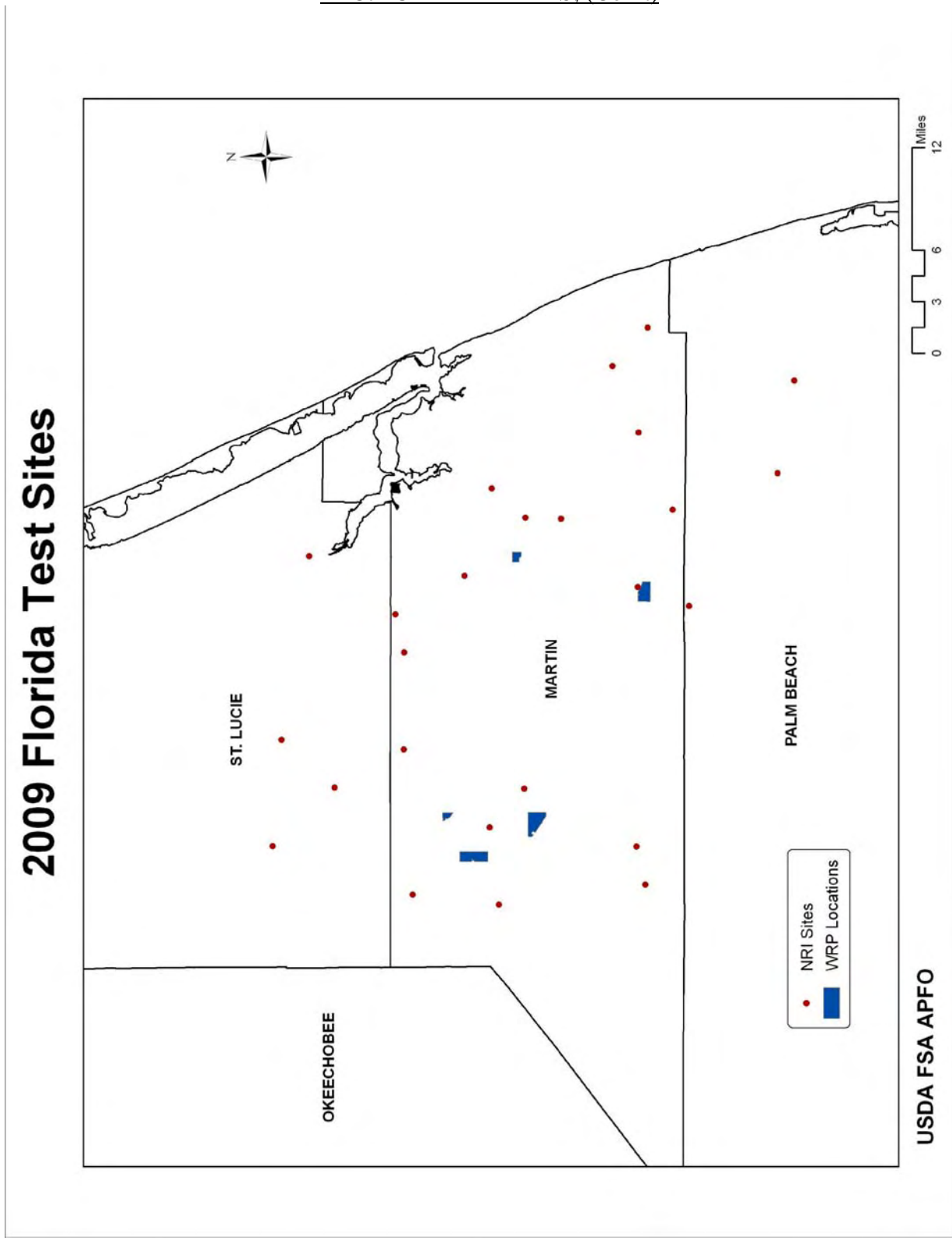


EXHIBIT 1

PROJECT AREA MAPS, (Con't)

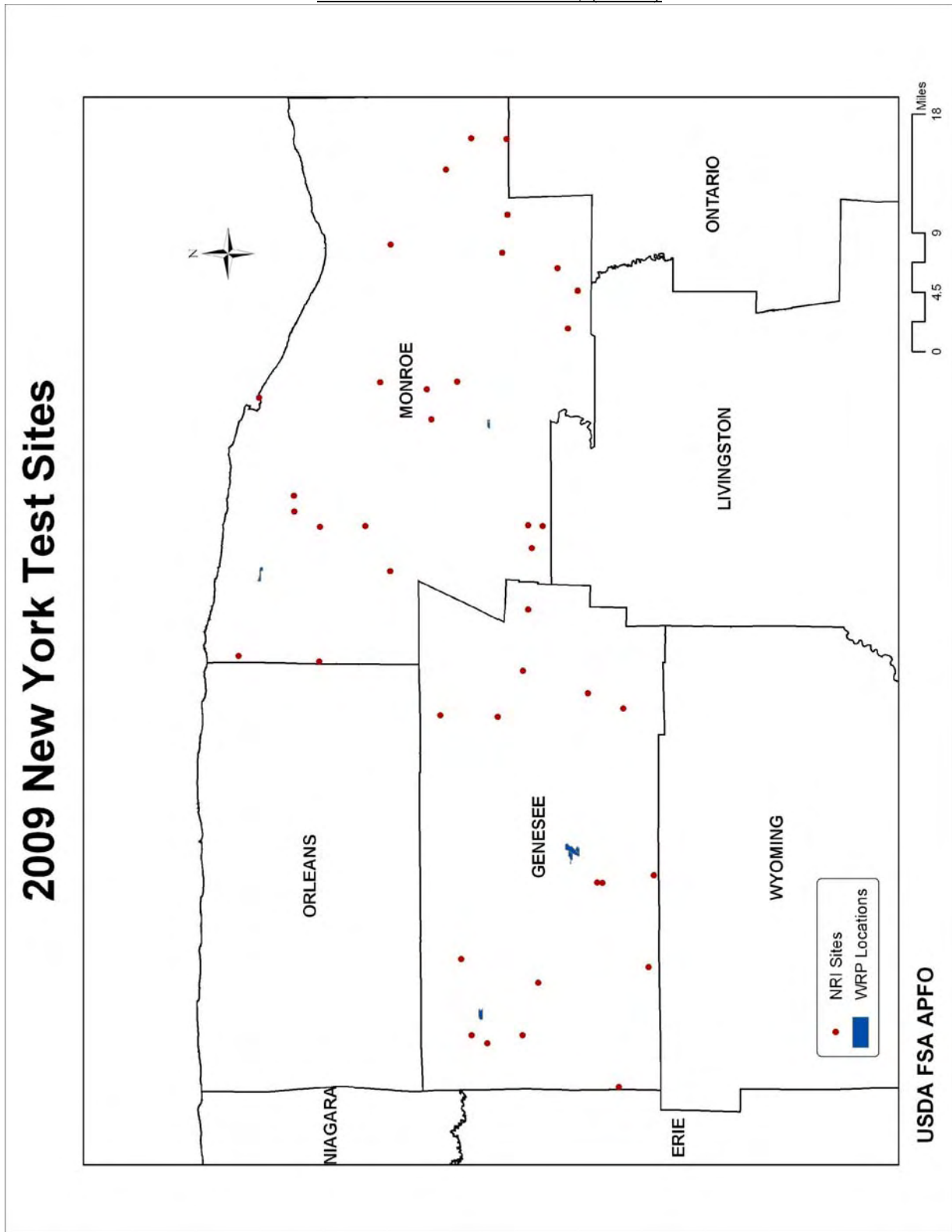


EXHIBIT 1

PROJECT AREA MAPS (Con't)

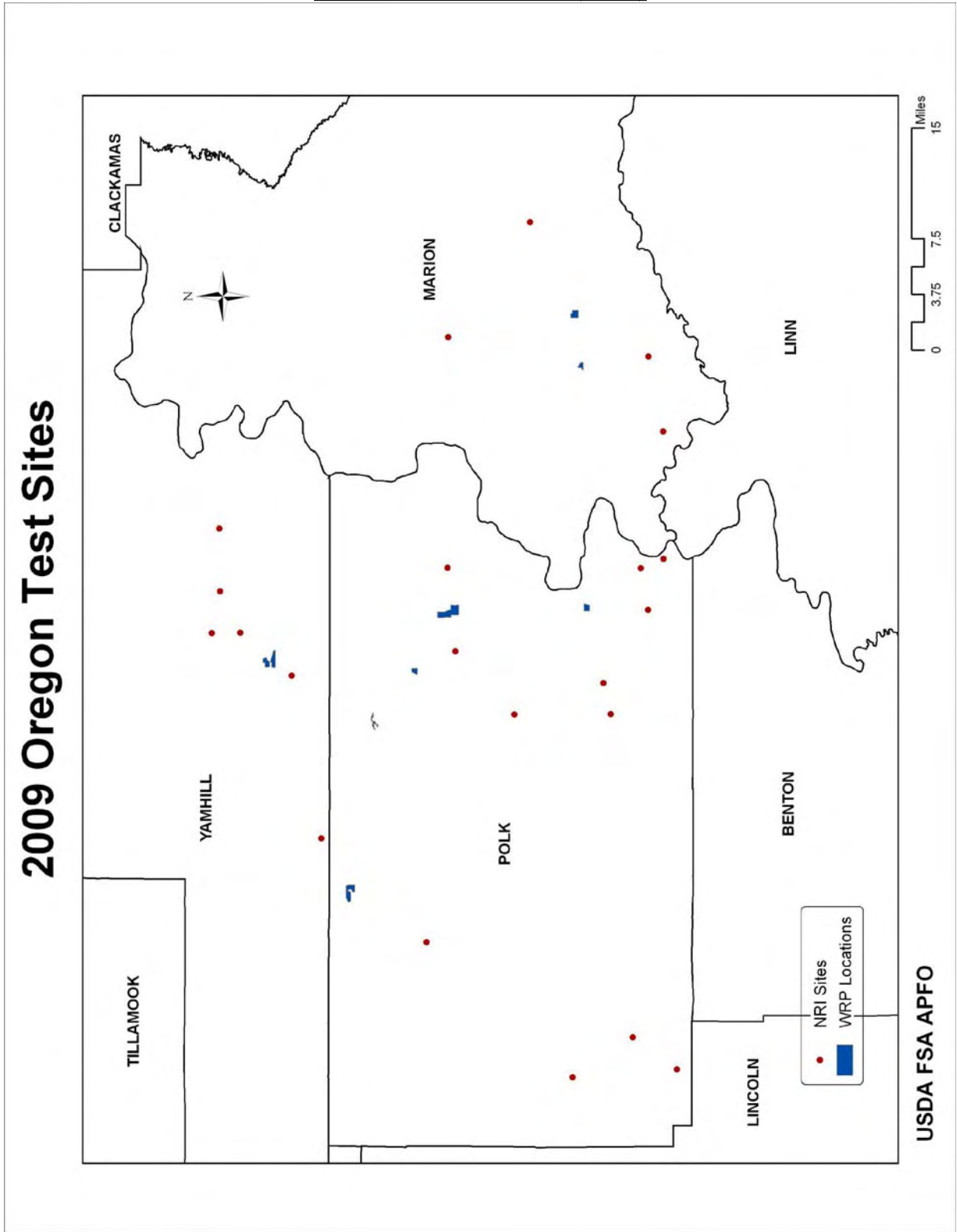
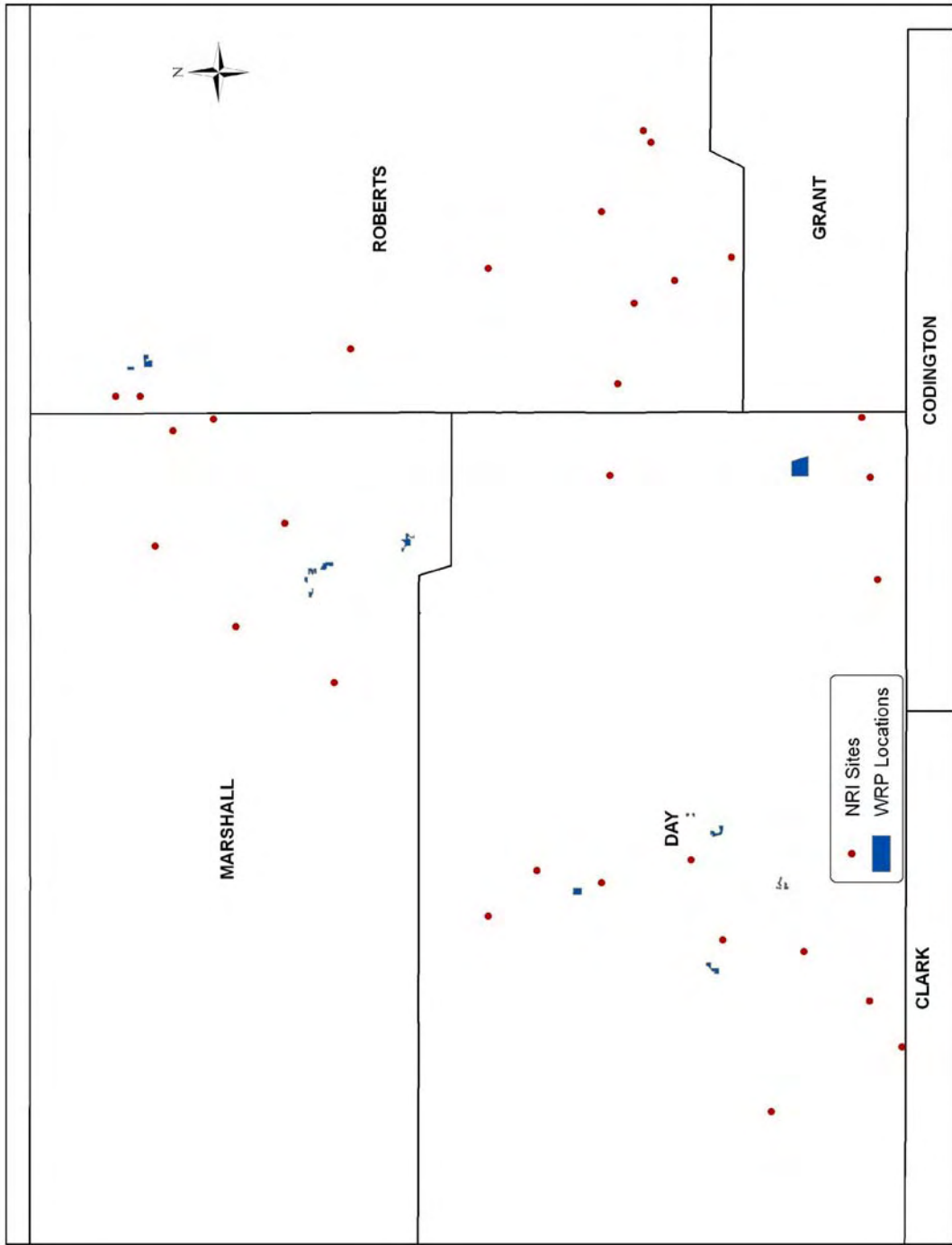


EXHIBIT 1

PROJECT AREA MAPS, (Con't)

2009 South Dakota Test Sites



USDA FSA APFO

EXHIBIT 2

PRICING WORKSHEETS

FIGURE (a) - NRI Pricing Worksheet

State	GSD	Site Qty	Acquisition Unit Price (Site)	Production Unit Price (Site)	NRI Total Price
AR	8 cm	31			
	15 cm	31			
	30 cm	31			
AR NRI subtotal					
CO	8 cm	39			
	15 cm	39			
	30 cm	39			
CO NRI subtotal					
FL	8 cm	25			
	15 cm	25			
	30 cm	25			
FL NRI subtotal					
NY	8 cm	40			
	15 cm	40			
	30 cm	40			
NY NRI subtotal					
OR	8 cm	23			
	15 cm	23			
	30 cm	23			
OR NRI subtotal					
SD	8 cm	30			
	15 cm	30			
	30 cm	30			
SD NRI subtotal					

EXHIBIT 2

PRICING WORKSHEETS

FIGURE (b) - WRP Pricing Worksheet

State	GSD	Acre Qty	Acquisition Unit Price (Acre)	Production Unit Price (Acre)	WRP Total Price
AR	8 cm	2,265			
	15 cm	2,265			
	30 cm	2,265			
AR WRI subtotal					
CO	8 cm	699			
	15 cm	699			
	30 cm	699			
CO WRI subtotal					
FL	8 cm	1,676			
	15 cm	1,676			
	30 cm	1,676			
FL WRI subtotal					
NY	8 cm	468			
	15 cm	468			
	30 cm	468			
NY WRI subtotal					
OR	8 cm	992			
	15 cm	992			
	30 cm	992			
OR WRI subtotal					
SD	8 cm	1,776			
	15 cm	1,776			
	30 cm	1,776			
SD WRI subtotal					

EXHIBIT 2

PRICING WORKSHEETS

FIGURE (c) – SUMMARY

State	NRI Subtotal	WRP Subtotal	Total
AR			
CO			
FL			
NY			
OR			
SD			

EXHIBIT 3

FILE NAMING CONVENTION & DIRECTORY STRUCTURE**Photo-Center File(s) Naming Convention:**

File Name: photo_1-09_<item>_<st>.txt

<item> - contract item number

<st> - two letter postal state abbreviation

Example: project_01001-020401R-txt

Image Files Naming Convention:

File Name: <type>_<r>_<location_id>_<cnv>_<yymmdd>.tif

<type> – file type (“geo” = georeferenced; “ortho” = orthorectified)

<r> - resolution in cm (8, 15, 30)

<location_id> - location identification number*

<cnv> - consecutively numbered value**

<yymmdd> - image exposure date

*location identifier can be found in the government furnished property

**consecutively numbered value must reset at each location

Example: geo_15_01001_020401R_3_090801.tif
ortho_15_01001_020401R_3_090801.tif

Directory Structure:

<u>Structure</u>	<u>Directory Contents</u>
(root)	
--- <stnnn*>	(photo-center file and metadata files)
-- geo	(all unprocessed, aux, and metadata files)
-- othro	(all ortho and metadata files)
-- gps	(gps and metadata files)
--- <stnnn*>	
-- geo	
-- othro	
-- gps	
(etc...)	

*Where <stnnn> is the two letter postal abbreviation combined with the county three digital FIPS code.

EXHIBIT 4
PROGRESS REPORT FORM

INSTRUCTIONS

Performance shall be reported weekly for each state. The report exhibited below shall be prepared and faxed to the APFO at (801) 956-3640, no later than Tuesday at 12:00 (MT) of the week following the reporting period. A cumulative progress record of all sites & locations acquired shall be maintained by the Contractor.

FAX TO: APFO Contracting Officer (801) 956-3640

Contractor Name: _____

Sol Number: 1-09 Project Item Number: _____

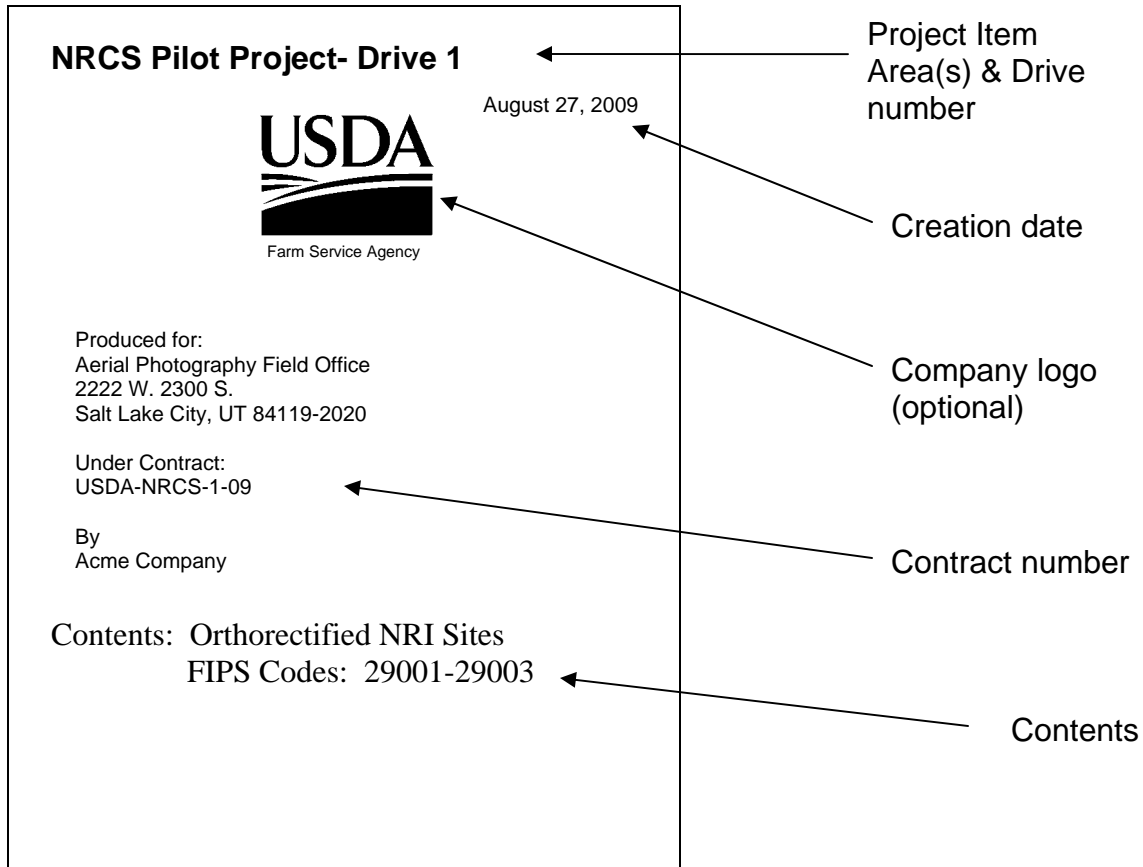
Reporting Period: _____

Project Area (state): _____

Program	GSD	Previous Cumulative Qty Acquired	Current Reporting Period Qty Acquired	Total Qty Acquired
NRI	8 cm			
	15 cm			
	30 cm			
WRP	8 cm			
	15 cm			
	30 cm			

EXHIBIT 5

EXTERNAL HARD DRIVE LABELING REQUIREMENTS



Approximate label dimensions: 3-1/2" (width) x 4-1/2" (height)

ELEMENT	EXAMPLE
DVD Number	DVD 1 of 1
Company name & logo	Acme Company
Content	Orthorectified NRI Sites & Accuracy and Control Reports State, FIPS Codes: 29001-29033
Contract number	USDA-NRCS-1-09
Creation date	August 27, 2009
FIPS code(s) & UTM zone	29001-29033 (UTM Zone 15)
Warranty date	Dec 31, 2009

EXHIBIT 6

NON-DISCLOSURE AGREEMENT

This Agreement is effective as of the ____ day of ____, 2009, by and between _____, and the United States Department of Agriculture, Natural Resources Conservation Service.

The Purpose of this agreement is to permit the Natural Resources Conservation Service (NRCS) to transmit or exchange National Resource Inventory (NRI) Information "For Official Use Only" to or with the _____ for the purpose of aerial photography acquisition.

NRI Information "For Official Use Only". The geographic locations of the Natural Resources Conservation Service National Resources Inventory (NRI) Sample Sites (Sites) are defined as NRI Information "For Official Use Only". NRI Information "For Official Use Only" may include, but is not limited to specifications, written descriptions, maps, aerial photographs, computer database files, geographic coordinates, and other information relating to the physical location of the sites. All reference to NRI Information "For Official Use Only" will be identified at the time of disclosure with an appropriate legend, marking, stamp or positive written identification as NRI Information "For Official Use Only" by the Natural Resources Conservation Service.

Restrictions. In order to maintain the integrity of the NRI, and to maintain confidentiality, privacy, and cooperation of land owners, the receiving party shall not release the locations of NRI Sites to the public, other agencies, any individual or other organization. With respect to Natural Resources Conservation Service NRI Information "For Official Use Only", the receiving party agrees to:

1. Use the NRI Information "For Official Use Only" solely for the purposes of this Agreement, any other use shall be only with the prior written consent of the Natural Resources Conservation Service;
2. Not disclose the NRI Information "For Official Use Only" to any third party or to any of their employees not having any "need to know" for the purposes of this Agreement, and provided that such third parties shall first have agreed in writing to be bound by a like obligation of confidentiality with respect to such NRI Information "For Official Use Only" as the receiving party is bound;
3. Take all reasonable steps, at least as great as the steps which the receiving takes with respect to its own NRI Information "For Official Use Only", to protect and safeguard the secrecy of and avoid the unauthorized disclosure or use of the NRI Information "For Official Use Only";
4. Promptly notify the Natural Resources Conservation Service of any misuse, misappropriation or unauthorized disclosure which may come to its attention; and
5. Not create second generation products from the NRI Information "For Official Use Only".

Exceptions to Non-Disclosure. _____ shall not be liable under this Agreement if a disclosure or use of NRI Information "For Official Use Only" received hereunder is made where the NRI Information "For Official Use Only":

1. Was in the public domain at the time of the disclosure or is subsequently made available to the general public without restriction and without breach of this Agreement by _____, or
2. Was known by _____ at the time of disclosure without restrictions on its use or independently developed by the receiving party, as shown by adequate documentation; or
3. Is disclosed to _____ by a third party without restriction and without breach of any agreement; or
4. Is disclosed with the prior written approval of the Natural Resources Conservation Service; and

5. Is used or disclosed pursuant to a court order, subpoena or other lawful order of a court or governmental authority of competent jurisdiction.

Term. This Agreement shall apply to NRI Information “For Official Use Only” provided to _____ during a period of one (1) year from the date set forth above, provided however, that either party may terminate this Agreement by giving the other party thirty (30) days notice in writing of its intention to terminate this Agreement. Termination shall not abrogate either party’s obligations hereunder for NRI Information “For Official Use Only” received prior to the date of termination.

Remedies. The receiving party acknowledges that its obligations to protect the NRI Information “For Official Use Only” are essential to the business interests of the receiving party, and that the disclosure of such NRI Information “For Official Use Only” in breach of this Agreement will cause the Natural Resources Conservation Service immediate, substantial and irreparable harm, the value of which would be extremely difficult to determine. Accordingly, the receiving party agrees that, in addition to any other remedies that may be available in law, equity, or otherwise for the disclosure or use of NRI Information “For Official Use Only” in breach of this Agreement, the Natural Resources Conservation Service shall be entitled to seek and obtain a temporary restraining order, injunctive relief or other equitable relief against the continuance of such breach, in addition to all other remedies, and without the requirement of posting a bond or undertaking or proving injury as a condition for relief.

Return of Materials. Upon written request from the Aerial Photography Field Office (APFO), or one (1) year after notice of final acceptance of imagery associated with this agreement, the receiving party agrees to destroy any materials and documents furnished by NRCS containing NRI Information “For Official Use Only” together with all copies made thereof by the receiving party, any geographically identifiable photographic imagery, and any scanned imagery that may have been retained for backup and recovery purposes. The receiving party shall deliver written certification to the Aerial Photography Field Office for documentation in the contract file that these actions have been taken and that the material has been destroyed with a copy of the certification forwarded to the Natural Resources Conservation Service.

In Witness Whereof, the parties have executed this Agreement by their authorized representatives as of the date set forth above.

By: _____
Authorized Signature

By: _____
Authorized Signature

Typed Name

Typed Name

Title

Title

EXHIBIT 7
WAGE DETERMINATION

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REGISTER OF WAGE DETERMINATIONS UNDER	U.S. DEPARTMENT OF LABOR
THE SERVICE CONTRACT ACT	EMPLOYMENT STANDARDS ADMINISTRATION
By direction of the Secretary of Labor	WAGE AND HOUR DIVISION
	WASHINGTON D.C. 20210
	Wage Determination No.: 1995-0222
William W.Gross	Revision No.: 23
Director	Date of Last Revision: 02/06/2008

Nationwide: Applicable in the continental U.S. Alaska, Puerto Rico, Hawaii and Virgin Islands.

Fringe Benefits Required Follow the Occupational Listing

OCCUPATION CODE - TITLE	MINIMUM WAGE RATE
31010 - Airplane Pilot	23.62
(not set) - First Officer (Co-Pilot)	21.51
(not set) - Aerial Photographer	11.80

EXCEPT SCHEDULED AIRLINE TRANSPORTATION AND LARGE MULTI-ENGINE AIRCRAFT SUCH AS THE B-727, DC-8, AND THE DC-9.

□

ALL OCCUPATIONS LISTED ABOVE RECEIVE THE FOLLOWING BENEFITS:

EXHIBIT 7

WAGE DETERMINATION

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HEALTH & WELFARE: \$3.16 per hour or \$126.40 per week or \$547.73 per month

VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 5 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173)

HOLIDAYS: A minimum of ten paid holidays per year, New Year's Day, Martin Luther King Jr's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.) (See 29 CFR 4174)

VACATION (Hawaii): 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 10 years, and 4 weeks after 15 years. Length of service

includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173)

HEALTH & WELFARE (Hawaii): \$1.37 per hour, or \$54.80 per week, or \$237.47 per month hour for all employees on whose behalf the contractor provides health care benefits pursuant to the Hawaii prepaid Health Care Act. For those employees who are not receiving health care benefits mandated by the Hawaii prepaid Health Care Act, the new health and welfare benefit rate will be \$3.16 per hour.

HAZARDOUS PAY DIFFERENTIAL: An 8 percent differential is applicable to employees employed in a position that represents a high degree of hazard when working with or in close proximity to ordnance, explosives, and incendiary materials. This includes work such as screening, blending, dying, mixing, and pressing of sensitive ordnance, explosives, and pyrotechnic compositions such as lead azide, black powder and photoflash powder. All dry-house activities involving propellants or explosives. Demilitarization, modification, renovation, demolition, and maintenance

operations on sensitive ordnance, explosives and incendiary materials. All operations involving regrading and cleaning of artillery ranges.

A 4 percent differential is applicable to employees employed in a position that represents a low degree of hazard when working with, or in close proximity to ordnance, (or employees possibly adjacent to) explosives and incendiary materials which involves potential injury such as laceration of hands, face, or arms of the employee engaged in the operation, irritation of the skin, minor burns and the like; minimal damage to immediate or adjacent work area or equipment being used. All operations involving, unloading, storage, and hauling of ordnance, explosive, and

incendiary ordnance material other than small arms ammunition. These differentials are only applicable to work that has been specifically designated by the agency for

EXHIBIT 7

WAGE DETERMINATION

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ordance, explosives, and incendiary material differential pay.

**** UNIFORM ALLOWANCE ****

If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance:

The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of \$3.35 per week (or \$.67 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs.

The duties of employees under job titles listed are those described in the "Service Contract Act Directory of Occupations", Fifth Edition, April 2006, unless otherwise indicated. Copies of the Directory are available on the Internet. A

links to the Directory may be found on the WHD home page at <http://www.dol.gov/esa/whd/> or through the Wage Determinations On-Line (WDOL) web site at <http://wdol.gov/>.

REQUEST FOR AUTHORIZATION OF ADDITIONAL CLASSIFICATION AND WAGE RATE {Standard Form 1444 (SF 1444)}

Conformance Process:

The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such

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WAGE DETERMINATION

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conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming process shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es) of employees. The conformed classification, wage rate, and/or fringe benefits shall be retroactive to the commencement date of the contract. {See Section 4.6 (C)(vi)} when multiple wage determinations are included in a contract, a separate SF 1444 should be prepared for each wage determination to which a class(es) is to be conformed.

The process for preparing a conformance request is as follows:

- 1) When preparing the bid, the contractor identifies the need for a conformed occupation(s) and computes a proposed rate(s).
- 2) After contract award, the contractor prepares a written report listing in order proposed classification title(s), a Federal grade equivalency (FGE) for each proposed classification(s), job description(s), and rationale for proposed wage rate(s), including information regarding the agreement or disagreement of the authorized representative of the employees involved, or where there is no authorized representative, the employees themselves. This report should be submitted to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work.
- 3) The contracting officer reviews the proposed action and promptly submits a report of the action, together with the agency's recommendations and pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6(b)(2) of Regulations 29 CFR Part 4).
- 4) Within 30 days of receipt, the Wage and Hour Division approves, modifies, or disapproves the action via transmittal to the agency contracting officer, or notifies the contracting officer that additional time will be required to process the request.
- 5) The contracting officer transmits the Wage and Hour decision to the contractor.
- 6) The contractor informs the affected employees.

Information required by the Regulations must be submitted on SF 1444 or bond paper.

When preparing a conformance request, the "Service Contract Act Directory of
Page 4

EXHIBIT 7

WAGE DETERMINATION

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Occupations" (the Directory) should be used to compare job definitions to insure that duties requested are not performed by a classification already listed in the wage determination. Remember, it is not the job title, but the required tasks that determine whether a class is included in an established wage determination. Conformances may not be used to artificially split, combine, or subdivide classifications listed in the wage determination.

** OCCUPATIONS NOT INCLUDED IN THE SCA DIRECTORY OF OCCUPATIONS **

Aerial Photographer

The aerial photographer must be skilled in reading flight maps, capable of assisting the pilot to adhere to flight lines, be able to level and operate a cartographic camera and its auxiliary equipment mounted in the aircraft so that the photographs that are taken will have the required forward lap and side lap for use in photogrammetric mapping equipment, and possess a working knowledge of aerial films and camera filters to insure proper exposure of the films.

First Officer (Co-Pilot)

Is second in command of commercial airplane and its crew while transporting passengers, mail, or other cargo on scheduled or nonscheduled flights. Assists or relieves an airline captain in operating the controls of an airplane; monitoring flight and engine instruments; and maintaining air-to-ground communications.

ATTACHMENT A

DIRECT-DIGITAL CAMERA SPECIFICATION FOR 2009 NRCS DIGITAL PILOT PROJECT

(Dated December 19, 2008)

1.0 INTRODUCTION AND BACKGROUND

The U.S. Federal Government has not yet established an independent government evaluation and calibration policy for digital camera systems since digital sensor technology is still rather new. Until a policy is developed and implemented, the U.S. Department of Agriculture (USDA), Farm Service Agency (FSA) has proceeded to validate the quality and capabilities of current digital camera systems by obtaining relevant information from camera manufacturers and data providers. The following specifications and requirements have been developed to ensure that any digital camera proposed for use on this pilot project meet minimum requirements to provide the highest quality image tiles and ortho products.

2.0 DIGITAL CAMERA SPECIFICATIONS AND REQUIREMENTS

This document covers digital camera specifications and requirements for the 2009 NRCS Digital Pilot project and is not applicable to any other USDA aerial photography contract. Acquisition of the digital imagery may be from airborne or space borne platforms. Digital cameras for acquiring precise vertical digital imagery are required to be tested and calibrated (geometrically and radiometrically). Digital camera systems proposed for use must be of comparable precision and quality with traditional stereoscopic mapping cameras. Digital camera systems must also be compatible with analytical mensuration procedures used in photogrammetric surveys and in preparing accurate orthophotography. Only digital camera systems approved by the Contracting Officer, which meet the requirements of these specifications as determined by appropriate camera system documentation and sample imagery submitted, shall be used on this project.

3.0 GENERAL REQUIREMENTS

Digital camera systems must be tested and calibrated with appropriate certification documentation. The digital camera must be geometrically stable and suitable for use in precise, high-accuracy photogrammetric orthoimagery applications. The digital camera system shall provide the following:

3.1 Ground Sample Distance

The camera shall provide the resolution and field of view necessary to meet the ground sample distance (GSD) requirement, as specified in Section B of the contract.

3.2 Single-chip Sensor Systems

The digital camera shall capture red, green, and blue, and near infrared bands (channels). Digital camera systems that use a single-chip sensor, such as a Bayer pattern color filter array, is permitted on this project if the system has method of acquiring and co-registering all color bands (channels), such as a dual boresighted camera system.

3.3 Pan Sharpening

Color interpretation or pan sharpening will be permitted to achieve the required GSD requirements if the panchromatic to color resolution ratio is no greater than 1:5.

3.4 Color Band and Depth

The camera shall capture a minimum of 12-bits per color band (channel).

3.5 Radiometric Accuracy

If the camera system requires more than one camera to acquire the multi-spectral data or the system contains more than one lens and/or shutter (mechanical or electrical), the difference in radiometric values between bands (channels) of a calibrated neutral object shall be less than $\pm 5\%$. For example, a 12-bit image shall not have more than ± 205 difference in between any color band.

3.6 Exposure Control

An automatic exposure control device is permitted, but a manual override capability is required for some types of terrain to achieve proper coverage and exposure.

3.7 Calibration Reports

The Contractor shall submit to the Contracting Officer any new or updated calibration reports that are issued after Government's approval for use within 10 business days of the report release/publication. The calibration reports shall include the same system information listed in Paragraph 4.1.

3.8 System Maintenance

The contractor shall perform all maintenance in accordance with the manufacturers recommended and established procedures. The contractor shall maintain a complete history of all maintenance done to the digital camera system and have it available for Government inspection. The contractor shall provide certification that the system has

been maintained, preventive maintenance and calibration performed, to the manufacturer's requirements.

3.9 Malfunctions

The contracting officer shall be notified of all digital camera system malfunctions within 72 hours with a written report of the malfunction. A malfunction is defined as a failure in any element or process of the digital camera system that causes an interruption of the normal operations of the system. Any malfunctions or failures of global positioning systems or inertial measurement unit systems shall be reported directly to the Contracting Officer.

4.0 DIGITAL CAMERA APPROVAL REQUIREMENTS

All digital camera systems must be approved by the Contracting Officer before acquiring imagery under this contract. When requesting approval, the Contractor shall submit an "digital camera approval package" that contains a report of calibration (see Paragraph 4.1), sample digital imagery (see Paragraph 4.2), and camera documentation (see Paragraph 4.3).

4.1 Calibration Reports

The package shall include the manufacturer and any owner/operator calibration report(s), if performed, for each digital camera proposed for use. The contractor shall follow manufacturer's specifications for appropriate owner calibration and/or recalibration. The calibration reports shall address the geometric performance of the system, and at a minimum, include:

- (a) Date of report
- (b) The name of the person or company performing the calibration
- (c) The methodology and procedures used for calibration
- (d) Final calibration parameters, such as calibrated focal length, lens distortion values, radiometric calibration parameters, and principal point location.

NOTE: The government recognizes that individual calibration reports, procedures, and parameters may be unique to a certain manufacturer since equipment and systems vary from manufacturer to manufacturer.

4.2 Sample Imagery Requirements

The package shall include sample images from the digital camera proposed for use. The sample imagery must be at the same resolution and represent similar terrain (agriculture, cropland, forest, etc.) for the project that the Contractor is requesting approval for. The digital camera sample imagery shall provide the following minimum characteristics:

- (a) Display the same GSD resolution being offered as indicated in Section B of the contract.

- (b) It may be collected no less than 12-bits per color band (channel), but be re-sampled to 8-bits per band for sample image delivery.
- (c) Color band (channels) order shall be RGB, NRG, and RGBN for natural color, infrared, and multi-spectral, respectfully (where N is the near infrared).
- (d) Sample image shall be ortho-rectified, with geodetic standards of North American Datum 1983 (NAD83) and UTM projection with the appropriate Zone indicated.
- (e) Sample shall be delivered in a GeoTIFF file formatted, using the TIFF/GeoTIFF requirements indicated in the contract.
- (f) The sample imagery shall fit on one standard DVD/CD-ROM, formatted as described in the contract.

4.3 Digital Camera Documentation Requirements

The package shall include detailed documentation of the digital camera and post-processing system proposed for use. Documentation may include brochures, technical specifications, marketing material, manufacturer's user manuals, or other descriptive literature. The documentation shall contain at a minimum the following information:

- (a) General overview information
- (b) Product configuration description
- (c) Camera component description
- (d) Technical specifications
- (e) Computer management and storage systems
- (f) Image acquisition and processing workflow.

4.4 Multiple Camera Approval

The use of more than one type of digital camera system (i.e.: DSS, ADS40, UltraCam) in the acquisition of the same project area is prohibited unless a waiver from the Contracting Officer is obtained.

ATTACHMENT B

USDA DIRECT-DIGITAL SMALL AREA ORTHOIMAGERY TILE SPECIFICATION

(Dated December 19, 2008)

USDA Farm Service Agency
Aerial Photography Field Office
2222 West 2300 South
Salt Lake City, UT 84119-2020
(801) 844-2910

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1.0 SCOPE

This document establishes the technical criteria to be used in the production of direct-digital orthoimagery tiles on the 2009 NRCS Digital Pilot Project contract issued by the Aerial Photography Field Office. This specification is not applicable to imagery required to be delivered unprocessed.

2.0 APPLICABLE DOCUMENTS

In the event of conflict between the contents of this specification and the documents referenced herein, the contents of this specification shall take precedence.

- 2.1 TIFF Specification Revision, 6 dated June 3, 1992 (Adobe Systems Inc.). The Tagged Image File Format (TIFF) is a copyrighted standard of Adobe Systems, Inc.
- 2.2 GeoTIFF Revision 1.0 Specification, dated December 28, 2000 (Version 1.8.2). The GeoTIFF Format Specification is a public domain extension of TIFF that provides a robust and flexible method of storing georeferencing information in a TIFF file.

3.0 GENERAL REQUIREMENTS

United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has several programs, such as the National Resources Inventory (NRI) and Wetlands Reserve Program (WRP), programs orthoimagery for various program uses including, but not limited to photo interpretation, area and point delineation, and Geographic Information Systems (GIS) measurements in support of multiple natural resource management and inventory programs. The complex nature and the need for consistent but radiometric correct imagery require the tiles to adhere to exact format and content of this specification.

3.1 General.

- (a) Geographic Extent. Each site/location shall cover the entire area with a mandatory meter buffer of 400 (± 40) on all four cardinal directions. Extents shall be computed by projecting the geographic corners and side midpoints to the appropriate projection, then adding the buffer on each side of the resulting minimum bounding rectangle.
- (b) Non-image data. Tiles shall not contain any non-image data. Non-image data includes, but not limited to, borders, fiducial marks, and artifacts. Non-image data also includes “fill” induced by a lack of elevation surface model coverage that results in white, black, or spurious intensity values.
- (c) Datums and Coordinates. All tiles shall be projected in the North American Datum of 1983 (NAD83), using the corresponding native Universal Transverse Mercator (UTM) zone (see Figure 1, UTM Zones) with coordinates in meters.

The vertical datum for all tiles shall be North American Vertical Datum of 1988 (NAVD88). The latest datum version shall be used.

- (d) Image Mosaicking. Tiles may be created using multiple digital images (“chips”) to produce the final product. Specular reflections in tiles should be minimized, especially in agriculture areas, by patching the area using chips from other imagery.
 - (1) Radiometry Balance. When a mosaic of two or more chips is made, the brightness and color values of the other chips will be adjusted to match that of the principal chip. The join lines between the overlapping chips 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.
 - (2) Edge-Matching. All chips shall not have more than ± 3 pixels offset between the principal chip.

3.2 Image Quality. All tiles shall have proper histograms and tone balance. Color imagery shall also have proper color balance and saturation. When adjusting the radiometric values on multi-spectral tiles, the natural color (RGB bands) should take precedence over the near infrared band.

- (a) Clipping. The tiles shall have a tonal range that prevents the clipping of highlight or shadow detail from the image. When calculated against the luminosity histogram (using the RGB bands), the cumulative pixel count between the 5 and 250 histogram bin values shall not be less than 98.0%, with a preferred value greater than 99%.
- (b) Contrast. When calculated against the luminosity histogram (using the RGB bands), the difference between the histogram bin value that contains 99.0% of the cumulative pixel count and the value that contains 1.0% shall be greater than 140 but less than 160 (with a goal of 150). If the cumulative pixel count percentage falls between two histogram bin values, the close value shall be used. For example, if the luminosity value 222 contains 99% of the cumulative pixel count and value 44 contains 1% count, therefore the difference is 178.
- (c) Histogram Median. When calculated against the luminosity histogram (using the RGB bands), the tiles shall have a median bin value between 108 and 148.
- (d) Color Balance. All tiles should have a neutral tonal range without the dominance of any individual color. The difference between the minimum and maximum value in a RGB triplet of any nearly neutral objects within the image shall be less than 5.
- (e) Band-to-Band Registration Accuracy. Misregistration between any color bands shall not exceed 1 pixel.

- (f) Image blemishes, scratches and artifacts. Imagery shall be free of blemishes, scratches, and artifacts that obscure ground feature detail. The following table defines the maximum acceptable limits for blemishes, scratches, and artifacts. Clusters of blemishes, scratches, and artifacts that do not individually meet these criteria may be considered unacceptable.

Acceptable Image blemishes, scratches and artifacts	
1 pixel wide	100 pixels in length
2 pixels wide	60 pixels in length
3 pixels wide	20 pixels in length
4 – 12 pixels wide	12 pixels in length

3.3 Radiometric Resolution.

- (a) Color Imagery. All imagery shall be an 8-bit RGB image in accordance with Section 6, RGB Full Color Images, of the TIFF Specification.
- (b) 4-Band Imagery. All imagery that contains both natural color and near infrared shall meet the same requirements as color imagery specified in the paragraph (a) above and shall have the samples saved in the following order: Red, Green, Blue, and infrared (RGBN).

3.4 Spatial Resolution. The spatial resolution will be specified in the contract. Tiles produced under this specification shall not be resampled from the original image or original capture, with resolution greater or less than the following numbers:

Ground Sample Distance (GSD)	Original Image Resolution	
	Minimum (cm)	Maximum (cm)
8 centimeters	4	9
15 centimeters	9	16.5
30 centimeters	16	33

- 3.5 Horizontal Accuracy. All tiles shall have 95% of all well-defined points tested fall within the specified distance in the contract.
- 3.6 File Format. All tiles shall be produced using a georeferenced tagged image format (GeoTIFF) in accordance with this specification, the GeoTIFF 1.0 Specification, and the baseline TIFF 6.0 Specification (stated in order of precedence). All tiles shall be readable by older applications that assume TIFF 5.0 or an earlier version of the specification. List 1, Tag Listings, List 2, Sample “tiffinfo” Output, and List 3, Sample ListGeo Output shows an example of a TIFF tag listing.

Tiles that use designated “Extended TIFF 6.0 file” features, as defined in Section 2 of the TIFF Specification, shall not be used. This includes, but not limited to, any of the major new extensions such as “tiled images.” Features designated as “not recommended for general data interchange” are considered extensions to the baseline TIFF specification and shall not be used.

(a) Tagged Image File Format (TIFF) Requirements

- (1) All public tags shall conform to the TIFF Specification and shall not be modified outside of the parameters given in the specification. Use of tag numbers not specified in the TIFF Specification for either Grayscale or RGB full color images, depending on color band of the tiles, is not permitted. As a minimum, the TIFF tags listed in Table 1, Required TIFF Tags, and Table 2, Required GeoTIFF Specific Tags, shall be included when creating tiles under this specification.
- (2) Tags numbered 32,768 or higher, sometimes called private tags, are reserved and shall not be used unless listed in Table 3, Approved Private Tags. Enumeration constants numbered 32,768 or higher are reserved and shall not be used.
- (3) Tags numbered in the “reusable” 65,000-65,535 range shall not be used.
- (4) All tile files shall be created using the little-endian byte order as specified in the TIFF Specification. Bytes 0-1 of the Image File Header must be “II” (4949.H).
- (5) All tiles files shall only have a single Image File Directory (IFD).
- (6) Tiled TIFF files are not allowed.

- (b) Georeferenced Tagged Image Format (GeoTIFF) Requirements. A GeoTIFF file is a TIFF file, and inherits the file structure as described in the corresponding portion of the TIFF Specification. All GeoTIFF specific information is encoded in several additional reserved TIFF tags, and contains no private Image File Directories (IFD's), binary structures or other private information invisible to standard TIFF readers.

The GeoTIFF specification uses a MetaTag (GeoKey) approach to encode dozens of data elements into just six TIFF tags. GeoKeys are structurally similar to TIFF tags, but at one lower level of abstraction. As a minimum, the four tags listed in Table 4, Required GeoTIFF MetaTags, shall be included when creating tiles under this specification.

4. VERIFICATION

Any tiles not meeting the requirement in Section 3 may be rejected for non-compliance. Each tile or, at the APFO's determination, a random sample from the lot may be inspected using the following methods. The use of automated processes, such as computer scripts, may be substituted for visual verification.

4.1 General.

- (a) Geographic Extent. Visual verification will be done to verify tiles coverage.
- (b) Non-image items. Visual verification will be done to ensure tiles do not contain any non-image.
- (c) Datums and Coordinates. Verification of georeferencing, correct datums and coordinate systems, by shall be accomplished by visually viewing the image using GIS software other than the software used to create the image.
- (d) Image Mosaicking. Visual verification will be done to verify tonal and brightness values across chips used to create the tiles and to verify edge-matching against adjacent tiles.

4.2 Image Quality.

- (a) Clipping. Visual or automated verification on the luminosity histogram will be done to verify overall clipping.
- (b) Contrast. Visual or automated verification on the luminosity histogram will be done to verify image contrast range.
- (c) Histogram Peak. Visual or automated verification on the luminosity histogram will be done to verify peak histogram value.
- (d) Color Balance. Visual or automated verification on the luminosity histogram will be done to verify overall clipping. Visual verification will be done to each tiles verify proper histogram and tone balance.
- (e) Band-to-Band Registration Accuracy. Visual verification on the luminosity histogram will be done to verify band-to-band registration.
- (f) Image blemishes, scratches and artifacts. Visual verification on the luminosity histogram will be done to verify that the image does not contain artifacts.

4.3 Radiometric Resolution. Visual verification will be done to verify bit depth and compliance with TIFF Specification.

4.4 Spatial Resolution. Visual verification will be done to measure spatial resolution.

- 4.5 Horizontal Accuracy. Visual verification will be done to verify tiles horizontal accuracy. This may include measurements compared against existing ground control points, control imagery or other means at the disposal of USDA.
- 4.6 File Format. Automated computer scripts will be used to verify that all GeoTIFF and TIFF Specifications are complied with. Correct encoding of all required Meta-Keys (also called GeoKeys) shall be confirmed by referencing each GeoKey using a software application designed to check each against the specifications.

5.0 NOTES

Reserved.

5.1 DEFINITIONS

Band – a range of wavelengths of electromagnetic radiation. Also, image data gathered at this wavelength range. Sometimes referred to as channel.

Brightness value – a number (normally 0-255 in a 8-bit image) representing a discrete intensity gray level of a pixel in an image.

Chip – each separate piece of a mosaick image that contributes to the final image.

Clipping – The presence of pixels exhibiting the minimum or maximum digital count in an image's dynamic range.

Dodging – manipulation of the intensity of part if a photograph by selectively shading or masking.

Field – refers only to the entire field, including the value, of the geokey (as defined in the TIFF Specification).

Ground Sample Distance (GSD) – the area of ground represented in each pixel in x and y components.

Image File Directory – contains information about the image. There must be at least 1 IFD in a TIFF file and each IFD must have at least one entry.

Metadata – description of the content, quality, condition, and other characteristics of the data.

Private tags – TIFF tags numbered 32,768 or higher. Private tags are not defined in the TIFF Specification.

Public tags – TIFF tags that are defined by the TIFF Specification.

Resample – interpolation of pixel values based upon neighboring pixel values.

Tag – refers only to the identifying number portion of the geokey (as defined in the TIFF Specification).

Figure 1, UTM Zones

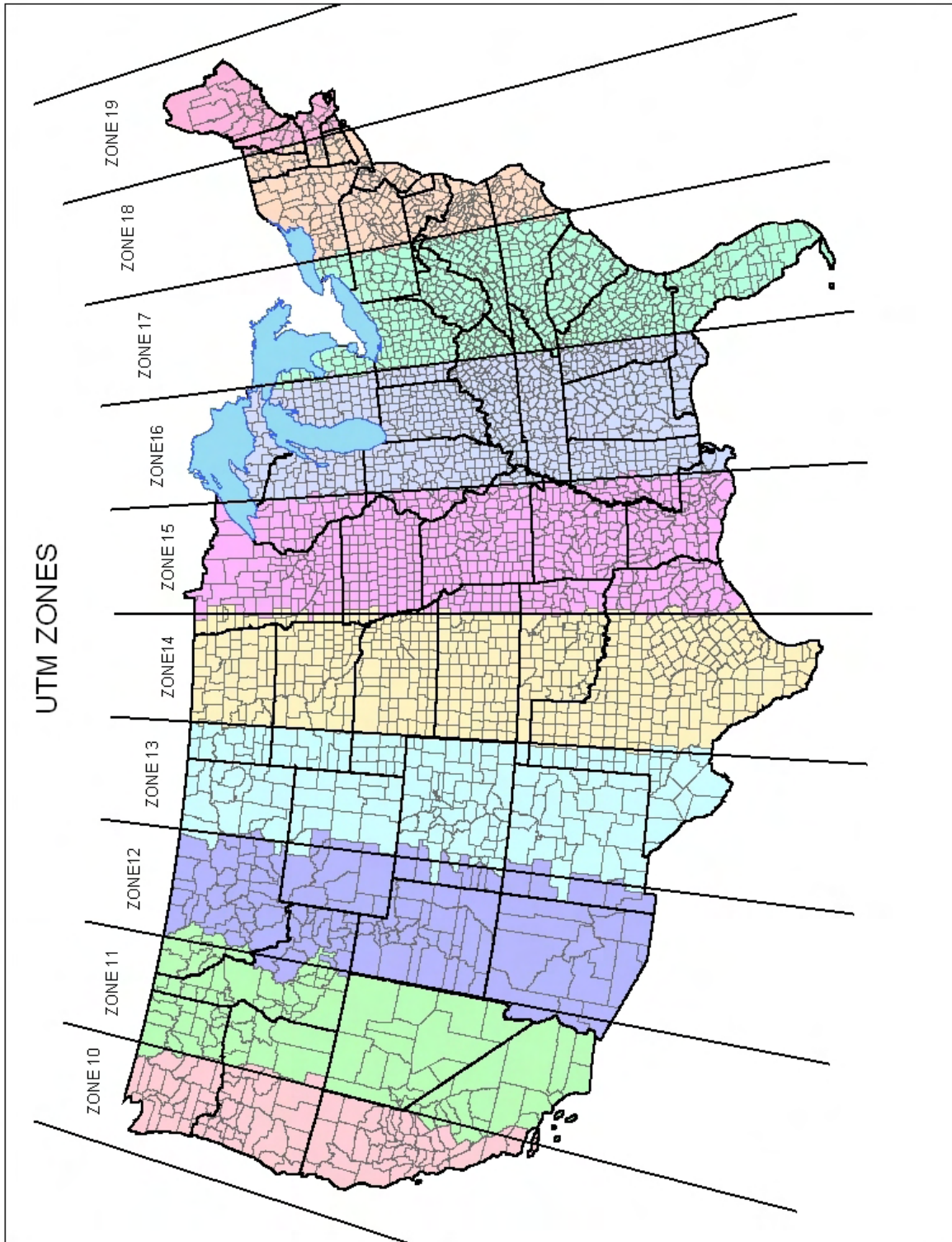


Table 1, Required TIFF Tags

TAG NAME	DESCRIPTION
ImageDescription tag (270.d, 10e.h)	The ImageDescription tag shall contain the program name. Tag should read: "2009 NRCS Digital Pilot Program"
DocumentName tag (269.d, 10d.h)	The DocumentName tag shall have the following form: <loc> _<r> where: <loc > - site/location id number listed in the boundary shapefile <r> - GSD resolution (in centimeters) Example: 01001-020401R_15

Table 2, Required GeoTIFF Specific Tags

TAG NAME	DESCRIPTION
ModelPixelScaleTag (33550.d, 830e.h)	The X and Y values must be populated and be equal to the ground distance of one tile pixel.
ModelTiepointTag (33922.d, 8482.h)	This tag specifies the (X,Y) ground coordinates of the (0,0) image pixel, by convention in the upper left corner of the image. All tiles shall use the UTM project reference frame. GeoTIFF allows considerable flexibility in how an image is tied to the ground, but tiles image data should be tied to the (0,0) pixel. The Z coordinate value should be set to 0. See section 2.6.1 of the GeoTIFF specification.
GeoAsciiParamsTag (34737.d, 87b1.h) (required)	This tag is used to store all the ASCII-valued GeoKeys. See section 2.4 of the GeoTIFF specification.
GeoKeyDirectoryTag (34735.d, 87af.h) (required)	This tag references all non-ASCII GeoKeys. All projection and datum information is stored in GeoKeys. See section 2.10.2.2 of this standard and section 2.4 of the GeoTIFF specification.

Table 3, Approved Private Tags

TAG NAME	ID (OWNER)
ModelPixelScaleTag	33550 (SoftDesk)
ModelTransformationTag	34264 (JPL Carto Group)
INGR Packet Data Tag	33918 (Intergraph)
INCR Flag Registers	33919 (Intergraph)
IrasB Transformation Matrix	33920 (Intergraph)
UnUsed	33921 (Intergraph)
ModelTiepointTag	33922 (Intergraph)
GeoKeyDirectoryTag	34735 (SPOT)
GeoDoubleParamsTag	34736 (SPOT)
GeoAsciiParamsTag	34737 (SPOT)

Table 4, Required GeoTIFF MetaTags

TAG NAME	DESCRIPTION
GTModelTypeGeoKey (1024.d, 400.h) (required)	The required value is 1 (ModelTypeProjected).
GTRasterTypeGeoKey (1025.d, 401.h) (required)	<p>a. The required value is 1 (RasterPixelIsArea) which is the default value.</p> <p>b. The "PixelIsArea" raster grid space uses coordinates I and J, with (0,0) denoting the upper-left corner of the image, and increasing I to the right, increasing J down. The first pixel-value fills the square grid cell with the bounds top-left = (0,0), bottom-right = (1,1) and so on; by extension this one-by-one grid cell is also referred to as a pixel. An N by M pixel image covers an area with the mathematically defined bounds (0,0),(N,M).</p> <p>c. This raster space designates the upper-left corner of an image. The coordinate pair values for this location shall be "a whole number of pixels." Each value "must be integer multiple of the resolution" of the tile image.</p> <p>d. The desired result is to have "Exact Pixel Registration," meaning that pixels from multiple images line up exactly. This should not be confused with overlaps or gaps, but the cells have to fall on an even multiple of the cell width and height from one another, and adjacent images cannot have cells starting halfway, or partially into the cells of the original image.</p>

<p>ProjectedCSTypeGeoKey (3072.d, c00.h) (required)</p>	<p>This key contains a coded value for the projection, datum, and possibly plane coordinate zone. Legal values for this key are listed in section 6.3.3.1 of the GeoTIFF specification.</p>
<p>PCSCitationGeoKey (3073.d, c01.h) (required)</p>	<p>This is a free text field for describing the projection and datum. Tile images are projected into the UTM coordinate system. These fields shall describe the projection, zone, and datum and shall be in the following form: <datum>/UTM Zone <number> <N/S> where: <datum> - common datum abbreviation, NAD83. <number> - UTM zone number. Example: NAD83/UTM zone 15N</p>
<p>GTCitationGeoKey (1026.d, 402.h) (required)</p>	<p>This is a free text field for providing a description of the tile. The GeoKey contents shall be in the following form. <program>_<loc>_<xx>_<r>_<yyyymmdd> where: <program> - Program Name (i.e., NRCS-Pilot). <loc> - site/location id number listed in the boundary shapefile <r> - GSD resolution (in centimeters). <yyyymmdd> - date of acquisition. b. Example: NRCS-Pilot_01001-020401R_15_20090714</p>
<p>ProjLinearUnitsGeoKey (3076.d, c04.h) (required)</p>	<p>This key contains a coded value for the linear units used by the projection. Legal values for this key are listed in section 6.3.3.1 of the GeoTIFF specification. Tiles shall use the code value of 9001 (“Linear_Meter”).</p>

List 1, Tag Listings

The following table summarizes the TIFF, GeoTIFF, and GeoKey requirements. The values in the table are consistent with the TIFF and GeoTIFF specifications, but there are fewer options than are allowed by TIFF. Additional guidelines and requirements for the values of tags and keys are detailed in the body of this standard. Additional public tags and keys may be used at the data producer's option, providing they do not conflict with the required tags.

TIFF tags required by baseline TIFF:

<u>TagName</u>	<u>Decimal</u>	<u>Hex</u>	<u>Type</u>	<u>Value</u>
ImageWidth	256	100	SHORT or LONG	
ImageLength	257	101	SHORT or LONG	
BitsPerSample	258	102	SHORT	8,8,8
Compression	259	103	SHORT	1
PhotometricInterpretation	262	106	SHORT	2
Orientation	274	112	SHORT	1
StripOffsets	273	111	SHORT or LONG	
SamplesPerPixel	277	115	SHORT or LONG	3
RowsPerStrip	278	116	SHORT or LONG	1
StripByteCounts	279	117	LONG or SHORT	

TIFF tags defined by GeoTIFF:

<u>TagName</u>	<u>Decimal</u>	<u>Hex</u>	<u>Type</u>	<u>Value</u>
ModelPixelScaleTag	33550	830E	DOUBLE	
ModelTiepointTag	33922	8482	DOUBLE	
GeoAsciiParamsTag	34737	87B1	ASCII	
GeoKeyDirectoryTag	34735	87AF	SHORT	

GeoKeys defined by GeoTIFF and used by APFO:

<u>TagName</u>	<u>Decimal</u>	<u>Hex</u>	<u>Type</u>	<u>Value</u>
GTModelTypeGeoKey	1024	400	6.3.1.1 code	1
GTRasterTypeGeoKey	1025	401	6.3.1.2 code	1
GTCitationGeoKey		1026	402	ASCII
ProjectedCSTypeGeoKey	3072	C00	6.3.3.1 code	
PCSCitationGeoKey	3073	C01	ASCII	
ProjLinearUnitsGeoKey	3076	C04	SHORT	

List 2, Sample “tiffinfo” Output

This listing is an output of the libtiff utility program “tiffinfo”.

TIFF Directory at offset 0x2370bc4
Image Width: 3247 Image Length: 3815
Resolution: 200, 200 (unitless)
Bits/Sample: 8
Compression Scheme: none
Photometric Interpretation: RGB color
Document Name: “Garvin NE 3309401:
Image Description: “USDA-FSA-APFO National Agriculture Imagery Program”
Samples/Pixel: 3
Rows/Strip: 1
Planar Configuration: single image plane

List 3, Sample ListGeo Output

The following is an example of a GeoTIFF tag and GeoKey listing from a NAIP image. This listing is the output of the libgeotiff utility program “listgeo”. The projection information below the line “End_Of_Geotiff” is implied by the standard projection and is not stored explicitly in the data file. The descriptions are retrieved from libgeotiff lookup tables in the listgeo application.

Geotiff_Information:
Version: 1
Key_Revision: 1.0
Tagged_Information:
ModelTiepointTag (2,3):
0 0 0
337962 3763838 0
ModelPixelScaleTag (1,3):
2 2 1
End_Of_Tags.
Keyed_Information:
GTModelTypeGeoKey (Short,1): ModelTypeProjected
GTRasterTypeGeoKey (Short,1): RasterPixelIsArea
GTCitationGeoKey (Ascii,45): "2004 NAIP n_3309403_nw_15_2_20050714"
ProjectedCSTypeGeoKey (Short,1): PCS_NAD83_UTM_zone_15N
PCSCitationGeoKey (Ascii,21): "NAD83 / UTM zone 15N"
ProjLinearUnitsGeoKey (Short,1): Linear_Meter
End_Of_Keys.
End_Of_Geotiff.

List 3, Sample ListGeo Output (con't)

PCS = 26915 (name unknown)

Projection = 16015 ()

Projection Method: CT_TransverseMercator

ProjNatOriginLatGeoKey: 0.000000 (0d 0' 0.00"N)

ProjNatOriginLongGeoKey: -93.000000 (93d 0' 0.00"W)

ProjScaleAtNatOriginGeoKey: 0.999600

ProjFalseEastingGeoKey: 500000.000000

ProjFalseNorthingGeoKey: 0.000000

GCS: 4269/NAD83

Datum: 6269/North American Datum 1983

Ellipsoid: 7019/GRS 1980 (6378137.00,6356752.31)

Prime Meridian: 8901/Greenwich (0.000000/ 0d 0' 0.00"E)

Projection Linear Units: 9001/metre (1.000000m)

Corner Coordinates:

Upper Left (337962.000,3763838.000) (94d45'16.56"W, 34d 0' 9.55"N)

Lower Left (337962.000,3756208.000) (94d45'11.47"W, 33d56' 1.94"N)

Upper Right (344456.000,3763838.000) (94d41' 3.51"W, 34d 0'13.09"N)

Lower Right (344456.000,3756208.000) (94d40'58.63"W, 33d56' 5.47"N)

Center (341209.000,3760023.000) (94d43' 7.54"W, 33d58' 7.53"N)