FLORIDA DEPARTMENT OF REVENUE ORTHOPHOTO SPECIFICATIONS
RFQ # 12/13-17

Mapping and GIS Section

1 INTRODUCTION

The purpose of this project is to fulfill the Department of Revenue's (FDOR) responsibilities of providing aid and assistance to the County Property Appraisers as specified in 195.002(1) F.S. and to at least once every 3 years furnish such aerial photographs and non-property ownership maps to the property appraisers as necessary to ensure that all real property within the state is listed on the roll. The Department of Revenue, for its own use and for the County Property Appraiser's use, is proposing to contract for the acquisition and delivery of digital orthophotography products. The Department intends to acquire ortho-rectified digital image data to support the development and analysis of the tax rolls for all 67 counties in Florida. The Department wants both Natural Color and Color Infrared (CIR) captured. The Consultant is only required to deliver Natural Color to FDOR under this task order.

Since 1972, Florida Statutes have stipulated cooperation between USGS, FDOT, and the state Water Management Districts to facilitate statewide topographic mapping efforts. Currently part of this is being done through the Florida Statewide Base Digital Orthophotography Program (FSBDOP) supported by partnerships and agreements between several state, federal, and local agencies represented by the Florida Digital Base Orthophotography Group.

This document defines the minimum requirements for providing digital orthophotography products for inclusion into the FSBDOP. All final data will be considered a public record as defined by applicable Florida Statutes.

All work performed must be in accordance with the ***Minimum Technical Standards, Rule Chapter* 5J-17*, F.A.C.***, pursuant to ***Chapter 472, Florida Statutes.*** Unless otherwise stated herein the orthophotography products will be in accordance with the ***"U.S. Geological Survey Base Orthoimagery Specification (draft)"***, dated August 23, 2010.

2 ABBREVIATIONS / DEFINITIONS

- **ASPRS** – American Society for Photogrammetry & Remote Sensing
- **CADD** - Computer Aided Design & Drafting
- **DEM** – Digital Elevation Model
- **ESRI** - Environmental Systems Research Institute
- **FDOR –** Florida Department of Revenue
- **FGDC** – Federal Geographic Data Committee
- **FIPS** – Federal Information Processing Standards
- **FSBDOG** – Florida Statewide Base Digital Orthophoto Group
- **FSBDOP** – Florida Statewide Base Digital Orthophoto Program
- **GSD** – Ground Sample Distance
- **IMU** - Inertial Measurement Unit

- **LiDAR** - Light Detection and Ranging
- **LAS –** A binary file standard supported by ASPRS for storing point location and attribute information primarily used for LiDAR data.
- **NSSDA –** National Standard for Spatial Data Accuracy
- **Orthophoto –** *same as Orthophotograph*
- **Orthophotograph –** A photographic copy, prepared from a perspective photograph, in which the displacements of images due to tilt and relief have been removed. (Source: American Congress on Surveying and Mapping and the American Society of Civil Engineers. *Definitions of Surveying and Associated Terms*. Library of Congress Catalogue Card Number 72-76807. Washington 1972, 1978.
- **Orthophotomosaic –** An assembly of orthophotographs forming a uniform-scale mosaic. (Source: American Congress on Surveying and Mapping and the American Society of Civil Engineers. *Definitions of Surveying and Associated Terms*. Library of Congress Catalogue Card Number 72-76807. Washington 1972, 1978.
- **Orthorectification –** A special case of image resampling whereby the effects of image perspective and relief displacement are removed so that the resulting orthoimage has uniformly scaled pixels, resembling a planimetric map. (Source: American Society for Photogrammetry and Remote Sensing *Manual of Photogrammetry Fifth Edition*, 2004, page 963)
- **Photogrammetry** - The science or art of obtaining reliable measurements by photography. (Source: American Congress on Surveying and Mapping and the American Society of Civil Engineers. *Definitions of Surveying and Associated Terms*. Library of Congress Catalogue Card Number 72-76807. Washington 1972, 1978.
- **RMSE** – Root Mean Square Error
- **USft** – United States Survey Feet
- **USGS** - United States Geological Survey
- **XML** – Extensible Markup Language

3 SAMPLE PROJECT AREA

Note: This information is provided as an example of work that would be requested under future task orders. The information below (# of tiles, square miles, counties presented in Attachment C) would change for the different counties throughout Florida as they are negotiated and assigned.

The project area to be mapped consists of 1413 5000 by 5000 foot tiles (cells) (approximately 1267 square miles) defined in ATTACHMENT A3 – ORTHOPHOTO PROJECT AREA and in the ArcGIS Shapefile *_Ortho_Project_Area* delivered under separate cover. This will serve as the final uniform tiling scheme for the seamless Orthophoto mosaic and supporting data deliverables.

4 ORTHOPHOTO SPECIFICATIONS

4.1 Sensor

All imagery shall be collected using a digital aerial sensor with current USGS type certification**.** The sensor must also have a documented bore-sight calibration performed within six months of image acquisition.

4.2 Image Spatial Resolution

All imagery will have an original spatial resolution no greater than 1.06. The Consultant will deliver images that have been resampled to 1.0 foot pixels as defined in section 7: Orthophoto Deliverables.

4.3 Horizontal and Vertical Datum

Unless otherwise requested the Orthophotography and other topographic products shall be referenced to the latest NGS realization of the North American Datum of 1983 (NAD83). The map projection referenced shall be to the appropriate Florida State Plane Coordinate System in units of US Survey Feet.

Orthophotography and other topographic products shall be referenced to the North American Vertical Datum of 1988 (NAVD 88), in units of US Survey Feet.

4.4 Horizontal Accuracy

Horizontal accuracy of the final Orthophotography product shall be determined using well defined photo identifiable check points. Computed local horizontal accuracy shall meet or exceed 5.06' at the 95% confidence interval as specified in the FGDC "*Geospatial Positioning Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy"*. A minimum of thirty (30) independent image checkpoints within the project area will be used for verification. Check points will be distributed throughout the dataset.

4.5 Digital Elevation Model

A Digital Elevation Model adequate to support accuracy specifications identified for this project must be created to accurately orthorecitfy photographic imagery.

When available the Agency will provide DEM(s) or LiDAR data if available from past projects. The Consultant is responsible for evaluating the accuracy of the DEMs, and when necessary processing additional break lines necessary to accurately orthorecitfy photographic imagery.

The Consultant will submit information in the final survey report and metadata which documents the source, enhancements made, and final accuracy of the DEMs utilized for the Orthophoto mapping project.

Additionally, if LiDAR data is acquired as part of the project, the classified scan data must be provided in LAS file format as per ASPRS LAS Specification 1.2 with associated metadata.

5 IMAGE ACQUISITION

5.1 Ground Control

Sufficient ground control shall be used to support one foot Ground Sample Distance (GSD) spatial resolution Orthophoto mapping for the project. All newly established ground control as well as the check points necessary to meet the requirements of the Florida Digital Base Orthophotography Group document ***"Ground Control Requirements for Florida Statewide Base Digital Orthophotography Program"***, dated September 1, 2011 see *Attachment A*.

The Consultant will coordinate with Agency staff in planning ground control surveys and methodology used for all horizontal and vertical control surveys.

5.2 Flight Season

ATTACHMENT A – SCOPE OF WORK

The specified flight season will be from October 1st through March 15th. To the greatest extent possible imagery should be obtained prior to January 30th. Imagery collected outside of this flight season will require written approval from contracting agency.

5.3 Image Quality

All images will be obtained under cloud free conditions and will be free of obscuring haze, smoke or other atmospheric conditions. Radiometric and color balancing of the imagery is described in Section *7: Orthophoto Deliverables*. All images must be collected with a sun angle no less than 30° .

Imagery shall be acquired at a density in the "high-rise" urban areas such that all road networks are clearly visible and that buildings show no signs of excessive tilt or lean.

6 INFORMATION PROVIDED BY THE FDOR AND COUNTIES

6.1 Digital Elevation Models

The FDOR will provide the Consultant with any DEMs or Light Detection and Ranging (LiDAR) data available from past projects and over flights as available.

Additionally, the final DEM generated for the development of work order deliverables must be provided to the FDOR in either an ASCII XYZ or LAS file format as per LAS Specification 1.1.

6.2 Historical Images

To maintain consistency between images collected during different years, historical examples of imagery shall be reviewed. If applicable color balancing should be performed that is consistent with previous FSBDOP county imagery.

7 ORTHOPHOTO DELIVERABLES

All deliverables will be the property of the FDOR and are considered public record. Written permission from the Agency must be obtained to release data to any party prior to final publication. The Consultant will deliver only the Ortho-Rectified color infrared and natural color imagery. Stereoscopic panchromatic imagery will be collected but not delivered unless specifically requested by the Agency. The Consultant will keep a copy of the original data for a period of five (5) years and must contact the FDOR before destroying the data.

The Consultant will document all data deliveries with an itemized transmittal letter.

7.1 File Formats and Image Types

Clarity and quality of the imagery is of the highest importance. Imagery will be delivered as uncompressed GeoTIFF images with valid projection header information. Refer to *ATTACHMENT A2 – REQUIRED TIFF AND GEOTIFF TAGS AND KEYS AND SAMPLE VALUES* for details. One GeoTIFF file per 5000 x 5000 foot tile is required.

a) *Natural Color Imagery* – The natural color, RGB, bands will be color balanced across the entire study area to the greatest extent possible to allow viewing of the image tiles as a visually seamless mosaic. Care should be taken during radiometric processing to avoid loss of detail in shadows and overexposure on bright surfaces such as bare ground and light colored building roofs.

b) *Color Infrared Imagery* – The color infrared bands will be radiometrically processed in a manner that preserves original image characteristics to the greatest extent practical. Systematic radiometric corrections to reduce sun angle and sensor variations are desired. Corrections for seasonal variations in ground cover are not to be done, however, care should be taken to ensure appropriate coloration of different vegetation types (e.g. deciduous, evergreen, etc.) is evident.

All orthoimages will be delivered according to the tiling scheme defined in *Section 4: Project Area*. Tiles will be contiguous and non-overlapping and will be suitable for creating a seamless image mosaic that includes no data void cells or gaps. Tile naming convention is as follows:

YYYY_NNNNNN_.TIF
YYYY_NNNNNN_RGB.TIF
YYYY_NNNNNN_CIR.TIF

Where: ***YYYY*** = Year in which last image was collected for the project.

NNNNNN = *A*ppropriate tile (cell) number values found in the Ortho_Project_Area shapefile.

Example: ***2009_112345.tif***
2009_112345_RGB.tif
2009_112345_CIR.tif

7.2 Metadata

A metadata file must be delivered for each GeoTIFF image file, the DEM used for OrthoPhoto production, and the cutline feature class in an ArcCatalog compatible XML format. The templates are also available in an XML file delivered under separate cover.

Metadata must be compliant with the Federal Geographic Data Committee's (FGDC) Content Standard for Spatial Metadata. All metadata must pass through the USGS metadata parser at http://geo-nsdi.er.usgs.gov/validation/ with no errors.

Metadata and the image collection date(s) must apply to each individual tile. The image Collection Date(s) field must be populated.

7.3 Image Cutline Feature Class

The Consultant will include a file "*ProjectName*_Cutlines" in ESRI Shape file format, containing a feature class of non-overlapping polygons with no data voids for the project area. Each polygon will delineate image capture dates used to seam together photographs for the production of orthophotography.

The feature class should conform to project boundary, and must have one date field named FLIGHTDATE that identifies the date the imagery was collected. The FLIGHTDATE attribute field should be populated as *YYYYMMDD*. Metadata must accompany the image cutline feature class.

7.4 Survey Report

The Consultant Professional Surveyor and Mapper (PSM) will prepare a survey report that documents all processes and is compliant with relevant Minimal Technical Standards for Professional Surveying and Mapping done in Florida. The Report of Orthophotography Survey that shall at a minimum include the following items:

- Project title and reference number
- Name and address of corporation (certificate of authorization number)
- Surveyor in responsible charge (contact information)
- Abbreviations, definitions; data sources; etc.
- Final deliverable listing of files stating filename with extension and delivery date in the appendix of the survey report.
- Introduction, purpose, objectives
- Scope of work
- Reference to ground Control Survey by title, survey date, corporation, and certifying Surveyor and Mapper.
- Describe all equipment, software, etc.
- Imaging sensor description and calibration report
- Airborne GPS report
- Aerial triangulation control coordinates and aerial triangulation blocks along with statistical summaries
- Check point accuracy analysis according to the FGDC NATIONAL STANDARD FOR SPATIAL DATA ACCURACY (FGDC-STD-007.3-1998
- Digital Orthophoto image acquisition dates and logs
- Digital Orthophoto image production specifications
- Digital elevation model acquisition (identify source and accuracy)
- If Light Detection and Ranging (LiDAR) data is collected then the following items shall be included.

1. LiDAR data acquisition dates and logs
2. LiDAR sensor description and calibration report
3. LiDAR specifications and procedures
4. LiDAR accuracy analysis according to the FGDC NATIONAL STANDARD FOR SPATIAL DATA ACCURACY (FGDC-STD-007.3-1998

- Digital orthophotography image accuracy NSSDA analysis according to the FGDC NATIONAL STANDARD FOR SPATIAL DATA ACCURACY (FGDC-STD-007.3-1998
- List the field and office personnel
- Professional Surveyor and Mapper certification will include the following: "**I CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS DIGITAL ORTHOPHOTOGRAPHY MAP MEETS OR EXCEEDS THE CONTRACT REQUIREMENTS AND THE MINIMUM TECHNICAL STANDARDS APPLICABLE FOR THIS WORK, AS SET FORTH IN CHAPTER 5J-17, F.A.C., PURSUANT TO CHAPTER 472, FLORIDA STATUTES**
- FGDC Metadata for each image tile in digital XML file format.
- Report will include a map overlay which will display the following items:
    1. All horizontal and vertical ground control with identify which points were constrained during aerial triangulation and which points were used for check during NSSDA analysis.
    2. Aerial triangulation blocks.
    3. Digital orthophotography cut lines and dates associated with the strips
    4. Digital orthophotography tile limits and layout
    5. LiDAR quality control locations and accuracy (if applicable)
    6. Base map features (USGS quad, county boundaries, major roads, major hydrography / water bodies, township/range lines, basin boundaries, cities)

The Consultant will deliver two (2) hardcopies of this report with the following final digital media deliverables.

Final Digital Media Submittal:

- Digital copy of the Orthophotography Survey report
- Digital copy of the Control Survey report.
- Orthophotography image tiles
- Metadata XML file for each image tile
- Final surface model used to rectify photography
- Classified LiDAR data files (*.LAS) if collected
- Image checkpoints used for accuracy testing in Shape File (point) format and excel format. The minimum required fields are listed in *TABLE 2 – SURVEY CHECK POINTS FIELD PROPERTIES.*
- Digital files used for Survey Report map overlays in ESRI Shape file format:
    1. All horizontal and vertical ground control with identify which points were constrained during aerial triangulation and which points were used for check during NSSDA analysis.
    2. Aerial triangulation blocks
    3. Digital orthophotography cut lines and dates associated with the photographs
    4. Digital orthophotography tile limits and layout
    5. Digital orthophotography Control Point Locations
    6. LiDAR QC accuracy locations (if applicable)
    Base map features

ATTACHMENT A – SCOPE OF WORK

Final submittals will be delivered on a single portable external USB or firewire computer drive and accompanied by an itemized transmittal letter. All deliverables will become the property of the FDOR. The drive shall be labeled on the outside with the following information:

- Project Title
- Purchase Order Number
- Work Order Name
- Work Order Number
- Consultant Name
- Project Manager's Name

Attachment A – Scope of work - TABLE 2 – SURVEY CHECK POINTS FIELD PROPERTIES

Field Name	Data Type	Description
CONTROLPTNAME	Text	Control point designation.
LATITUDE	Double	Geographic Y-coordinate specifying vertical position.
LONGITUDE	Double	Geographic X-coordinate specifying horizontal position.
ELLIPSOIDHEIGHT	Double	Height above or below the reference ellipsoid (meters).
NORTHING	Double	State Plane Y-coordinate in US Survey Feet.
EASTING	Double	State Plane X-coordinate in US Survey Feet.
NAVD88HEIGHT	Double	Orthometric height in US Survey Feet.
DESCRIPTION	Text	Additional information or details pertaining to the control point.

8 ORTHOPHOTO PROJECT SCHEDULE

All final deliverables must be received before June 18, 2014. The Consultant will submit a proposed project schedule. The Consultant will notify the Agency when aerial images have been collected.

Attachment A1- Scope of Work – GROUND CONTROL SURVEY REQUIREMENTS

Ground Control Requirements for
Florida Statewide Base Digital Orthophotography Program

Purpose:
The purpose of this document is to specify the requirements for a geodetic control survey to support one-foot ground sample distance resolution county aerial Orthophoto mapping.

1. All surveying and mapping work performed shall meet the ***Minimum Technical Standards, Rule Chapter* 5J-17*, F.A.C.***, pursuant to ***Chapter 472, Florida Statutes.***
    - Global Positioning System (GPS) techniques shall be used to establish horizontal and vertical positions on targeted and/or well-defined photo identifiable points that will be used as control for aerial photogrammetric mapping. New photo control point positions shall be identified in the field by a survey mark.
    - When aerial panels are used, the vertical offset from top of mark to the panel surface shall be measured and recorded.
    - In rare circumstances where the photo identifiable control point cannot be occupied directly, a horizontal offset distance of less than 1 meter from the occupied survey mark may be used. Field survey measurements of sufficient precision must be collected and recorded to allow accurate coordinate computation of the photo identifiable point from the offset mark.
2. All established GPS control shall be referenced to the current NGS realization of the NAD83 based on redundant, interconnected and direct ties to existing National Spatial Reference System (NSRS) stations. The photogrammetric ground control network will meet or exceed the 10-centimeter Local Accuracy Standard as set forth by the FGDC "*Geospatial Positioning Accuracy Standards, Part 2: Standards for Geodetic Networks"*.
3. Sufficient (minimum four) published NAVD88 benchmarks shall be included in the control network to insure accurate elevations can be computed from GPS ellipsoid values through local adjustment using the latest NGS geoid model. The Local vertical positional accuracy required is 10 centimeters.
4. Where conditions dictate differential leveling may be used to establish elevations on photo control points from the nearest ground control network station or published NSRS vertical station within a 5 mile radius from the photo control point. The differential leveling procedures used shall meet or exceed ***Minimum Technical Standards*** for vertical control accuracy.
5. Proposed control point locations may be moved up to 500 feet from their original proposed locations to insure safety, and if the proposed point is ambiguous or no longer exists. Such control points shall be documented as moved.
6. A field sketch with survey date, GPS satellite visibility and weather conditions at the time of GPS data collection shall be prepared for each control point site.
7. Digital photo(s) shall be taken showing the exact location of the control point, preferably while the point is occupied by the GPS unit setup. Digital photo filenames shall include the control point name.
8. Submittal Items:

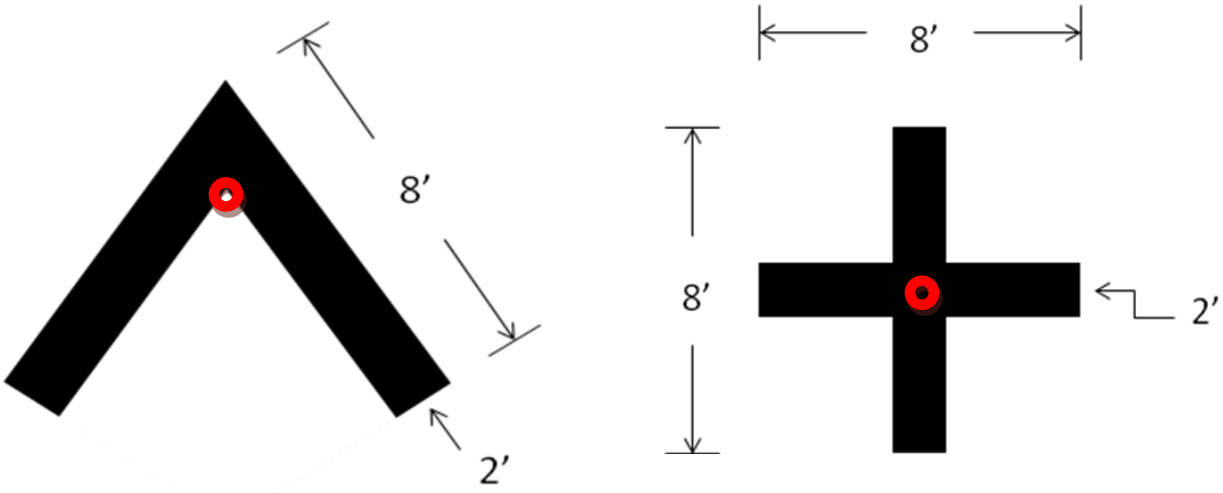
A. The Professional Surveyor and Mapper (PSM) will prepare a certified report of Control Survey that shall at a minimum include the following items:
   - Project title and reference number
   - Name and address of corporation (certificate of authorization number)
   - Surveyor in responsible charge (contact information)
   - Abbreviations; data sources; etc.
   - Introduction, purpose and objective
   - Description and scope of work
   - Describe equipment, software, etc.
   - Describe the accuracy standards and specifications, procedures and methodology for establishing ground control
   - Describe and list the geodetic control (existing and newly-established), displaying the horizontal and vertical coordinates, Datum used, Geoid model and error estimates (95% confidence level)
   - Accuracy reporting will be according to FGDC geospatial accuracy standards: Report the horizontal and vertical (heights) accuracies (local and network) according to the FGDC STANDARDS FOR GEODETIC NETWORKS (FGDC-STD-OO7.2-1998)
   - List the field and office personnel
   - Date of field survey (Last date of field measurements).
   - Describe monumentation recovered and set
   - Professional Surveyor and Mapper certification will include the following: "**I CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS CONTROL SURVEY MEETS OR EXCEEDS THE CONTRACT REQUIREMENTS AND THE MINIMUM TECHNICAL STANDARDS APPLICABLE FOR THIS WORK, AS SET FORTH IN CHAPTER 5J-17, F.A.C., PURSUANT TO CHAPTER 472, FLORIDA STATUTES**
   - Report will include a map overlay which will display the following items:
     - GPS baseline network, indicate repeated measurements
     - Existing horizontal and vertical geodetic control
     - Newly-established photogrammetric control
     - Base map features (county boundaries, major roads, major hydrography / water bodies, township/range lines, cities)

B. Digital Media Submittal on CDs/DVDs shall contain:
   - Digital copy of the Control Survey report
   - Existing geodetic control recovery/to-reach descriptions, sketches, field notes, photographs, etc
   - Newly-established photogrammetric control location descriptions, sketches, field notes, photographs, etc
   - Copies of Global Positioning System (GPS) data logs and a listing of GPS occupations
   - All GPS data observed and produced during the survey (digital format), including the raw observation data, processed baselines, loop closures and least squares adjustments (free and fixed)

- A Microsoft EXCEL spreadsheet file list of final control with datum header information along with point name, geographic (Latitude, Longitude), grid (State Plane Zone Northing and Easting), and elevation values for control points. Grid coordinates and elevations shall be in units of US survey feet. Any horizontal and vertical mark offsets measured shall be identified and applied to the aerial panel or photo identifiable feature position and/or surface (poles shall use ground surface at base of pole). Offset measurements shall be included to verify computations. See example in *CONTROL TABLE EXAMPLE*.
- Sketches and digital pictures of photo control point sites identifying measured point location and type of mark including target size and material if applicable.

Aerial Panel Dimensions (if required)

= Location of survey mark**.**



CONTROL TABLE EXAMPLE

FINAL ADJUSTED HORIZONTAL AND ORTHOMETRIC HEIGHT VALUES FOR MARION COUNTY (PD6027) POST FLIGHT PHOTO POINT

UNITS ARE U.S. SURVEY FEET (USft)

HORIZONTAL DATUM IS NAD 83/2007.

STATE PLANE ZONE IS FLORIDA WEST.

ORTHOMETRIC HEIGHT DATUM IS NAVD 88

ALL CONTROL STATION VALUES ARE DERIVED BY STATIC GPS OBSERVATIONS FROM PUBLISHED NGS CONTROL

	GPS Control Station - Geographic			GPS Control Station - USft			Offset from GPS Station to Photo ID Point - ft			**FINAL Photo ID Control - USft**		
PHOTO_ID	LATITUDE	LONGITUDE	ELLIP_HGT (meters)	NORTHING	EASTING	ORTHO_HGT	Offset - North	Offset - East	Offset - Vert	**NORTHING**	**EASTING**	**ORTHO_HGT**
D510S010	29 29 44.73172	-82 24 24.26473	1.7569	1876786.20	526773.97	97.18	0.00	2.00	0.00	1876786.20	526775.97	97.18
D510S011	29 28 42.07552	-82 3 20.32535	-4.4967	1870232.35	638460.51	77.18	-2.50	-0.78	0.00	1870229.85	638459.73	77.18
D510S012	29 30 29.98811	-81 51 49.10517	10.5297	1881156.88	699540.72	127.11	0.00	0.00	0.00	1881156.88	699540.72	127.11
D510S013	29 19 32.46883	-81 58 11.18511	-5.8319	1814716.87	665798.44	72.96	0.00	0.00	1.00	1814716.87	665798.44	73.96
D510S014	29 21 52.50874	-81 44 25.40237	-16.3667	1828952.74	738861.52	39.27	0.00	0.00	0.00	1828952.74	738861.52	39.27
D510S015	29 17 40.65095	-81 39 9.97229	-27.6545	1803585.22	766847.02	2.34	1.00	0.00	0.50	1803586.22	766847.02	2.84

ATTACHMENT A2 - Scope of Work -– REQUIRED TIFF AND GEOTIFF TAGS AND KEYS AND SAMPLE VALUES

TIFF Tags Required

Tag Name	Decimal	Hex	Type	Sample Value
ImageWidth	256	100	Short or Long	5000
ImageLength	257	101	Short or Long	5000
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	8 510008 . . .
SamplesPerPixel	277	115	Short or Long	3
RowsPerStrip	278	116	Short or Long	34
StripByteCounts	279	117	Short or Long	510000 510000 . . .
ImageDescription	270	10E.H	ASCII	Agency Digital Orthophoto
DocumentName	269	10D.H	ASCII	<Cell Number> <Zone> <State>

Tiff Tags Defined by GeoTIFF:

Tag Name	Decimal	Hex	Type	Sample Value
ModelPixelScaleTag	33550	830E	Double	1.0 1.0 0
ModelTiePointTag	33922	8482	Double	0 0 0 525000 188000 0
GeoAsciiParamsTag	34737	87B1	ASCII	Agency One Foot Resolution <start flight date> - <end flight date> NAD 1983 (NSRS 2007) State Plane Florida West FIPS 0902 Feet
GeoKeyDirectoryTag	34735	87AF	Short	1 1 0 6 1024 0 1 0 1025 0 1 1 1026 34737 78 0 3072 0 1 26959 3073 34737 53 78 3076 0 1 9003

GeoKeys Defined by GeoTIFF:

Tag Name	Decimal	Hex	Type	Sample Value
GTModelTypeGeoKey	1024	400	Short	0
GTRasterTypeGeoKey	1025	401	Short	1
GTCitationGeoKey	1026	402	ASCII	Agency One Foot Resolution <start flight date> - <end flight date>
ProjectedCSTypeGeoKey	3072	C00	Short	2882
PCSCitationGeoKey	3073	C01	ASCII	NAD 1983 (NSRS 2007) State Plane Florida West FIPS 0902 Feet
ProjLinearUnitsGeoKey	3076	C04	Short	9003