Agenda

- RFQ (5 min)
- Scoping (10 min)
- SOW (30 min)
- Plans (5 min)
- Best Practices/Lessons Learned (10 min)

Request for Qualifications (RFQs)

- **Expertise with GIS; demonstrated knowledge of AC150/5300-18**
- **Demonstrated experience conducting Aeronautical Surveys**
  - AC150/5300-16 and -17
  - NGS specifications, standards, and software
  - National Spatial Reference System (NSRS)
  - Continuously Operating Reference Stations (CORS)
  - High Accuracy Reference Network (HARN)
  - Aerial Photography
  - Photo Control Points, recovering and establishing Survey Marks
- **Demonstrated experience developing Airport Layout Plans (ALP projects; Master Plans)**
- **Experience working on an operating airport (airside / landside development projects)**

Airports GIS | Project Scoping Meeting

- **Reference -18B, Table 2-1**
  - Safety Critical Features?
  - Resolution/Accuracy?
  - Imagery Required? Photo Scale(s)?
  - Contour intervals?
  - Aeronautical Survey and Airspace Analysis Required? Which Runway(s)?
  - Design and As-Built Data?
  - On-going Projects
  - ALP Follow-on Project?

- **Identify responsible party and data source for each feature and attribute**
- **Statement-of-Work; implementation plans**
- **Most airport development and planning projects require some GIS expertise**

Airports GIS | Project Scope

- **AC 150/5300-18 (Table 2-1)**
  - Evaluate Existing Data
  - NGS (PACS/SACS, Obstruction Surveys)
  - Airports-GIS
  - FAA (5010/approach procedures)
- **Obstruction Survey/Airport Airspace Analysis (OS/AAA) → Safety Critical Data (Table 4-1)**
  - Primarily Obstacles, NAVAIDS and Runway Control Points (Ends, profile(s): near-term need
  - Virtually all attributes
  - Validate against existing "official" data
- **Robust Data Collection (eg., data for an "eALP" project)**
  - Feature-by-Feature, Attribute-by-Attribute determination
  - Runway AS/AAA: for near-term, needed development/approaches

Airports GIS | Project Scope (continued)

- **New Non Safety-Critical Project**
  - Taxiway/Apron/Hangar/Environmental
  - **All Features/All Attributes** associated with the project (eg. an apron project could include: apron, lighting, signage, marking, utilities, etc.)
- **Primary Airport Control Station (PACS)**

  Secondary Airport Control Station (SACS)
  - Primary airports / non-primary airports (top tier): use/re-establish
  - Others: evaluate costs vs. benefits over next 5 years
- **Imagery**
  - Consider both initial and subsequent usage (multiple projects)
  - Image areas: airport core; airport periphery; obstacle evaluation surfaces

Project Scoping | Table 2-1

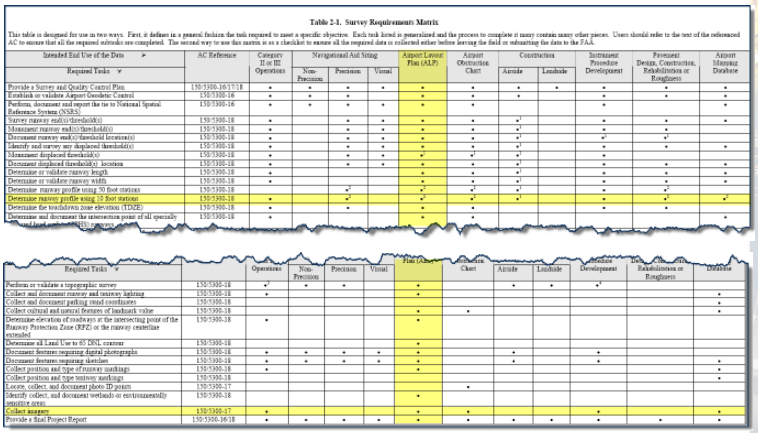


Table 2-1. Survey Requirements Matrix

This table is designed for use in two ways. First, it defines in a general fashion the task required to meet a specific objective. Each task listed is generalized and the process to complete it many contain many other pieces. Users should refer to the text of the referenced AC to ensure that all the required subtasks are completed. The second way to use this matrix is as a checklist to ensure all the required data is collected either before leaving the field or subsmitting the data to the FAA.

Intended End Use of the Data → / Required Tasks ↓	AC Reference	Category II or III Operations	Navigational Aid Siting			Airport Layout Plan (ALP)	Airport Obstruction Chart	Construction		Instrument Procedure Development	Pavement Design, Construction, Rehabilitation or Roughness	Airport Mapping Database
			Non-Precision	Precision	Visual			Airside	Landside			
Provide a Survey and Quality Control Plan	150/5300-16/17/18	•	•	•	•	•	•	•	•	•	•	•
Establish or validate Airport Geodetic Control	150/5300-16	•	•	•		•	•	•		•	•	•
Perform, document and report the tie to National Spatial Reference System (NSRS)	150/5300-16	•	•	•	•	•	•			•		•
Survey runway end(s)/threshold(s)	150/5300-18	•		•	•	•	•	•[1]		•	•	•
Monument runway end(s)/threshold(s)	150/5300-18	•		•	•	•	•	•[1]		•	•	
Document runway end(s)/threshold location(s)	150/5300-18	•		•	•	•	•	•[1]		•	•[1]	
Identify and survey any displaced threshold(s)	150/5300-18	•		•	•	•	•	•[1]		•	•	•
Monument displaced threshold(s)	150/5300-18	•		•	•	•[1]	•[1]	•[1]		•		
Document displaced threshold(s) location	150/5300-18	•		•	•	•	•	•[1]		•	•	•
Determine or validate runway length	150/5300-18	•				•	•	•[1]		•	•	•
Determine or validate runway width	150/5300-18	•				•	•	•[1]		•	•	•
Determine runway profile using 50 foot stations	150/5300-18			•[2]		•[2]	•[2]	•[1]		•	•[2]	
Determine runway profile using 25 foot stations	150/5300-18	•		•[2]		•[2]	•[2]	•[1]		•	•[2]	•[2]
Determine the touchdown zone elevation (TDZE)	150/5300-18	•		•		•	•			•	•	
Determine and document the intersection point of all specially prepared hard surface (PHS) runways	150/5300-18	•				•	•					•

Required Tasks ↓		Operations	Non-Precision	Precision	Visual	Plan (ALP)	Obstruction Chart	Airside	Landside	Procedure Development	Design, Construction, Rehabilitation or Roughness	Database
Perform or validate a topographic survey	150/5300-18	•[1]	•	•		•		•	•	•[1]		
Collect and document runway and taxiway lighting	150/5300-18	•				•						•
Collect and document pathing (mid coordinates	150/5300-18											•
Collect cultural and natural features of landmark value	150/5300-18					•	•					•
Determine elevation of runway at the intersecting point of the Runway Protection Zone (RPZ) or the runway centerline extended	150/5300-18	•				•						
Determine all Land Use to 65 DNL contour	150/5300-18					•						
Document features requiring digital photographs	150/5300-18	•	•	•	•	•		•		•		
Document features requiring sketches	150/5300-18	•	•	•	•	•		•		•		•
Collect position and type of runway markings	150/5300-18	•				•						•
Collect position and type taxiway markings	150/5300-18											•
Locate, collect, and document photo ID points	150/5300-17						•					
Identify collect, and document wetlands or environmentally sensitive areas	150/5300-18					•						
Collect imagery	150/5300-17	•				•	•			•		•
Provide a final Project Report	150/5300-16/18	•	•	•	•	•	•	•	•	•	•	•

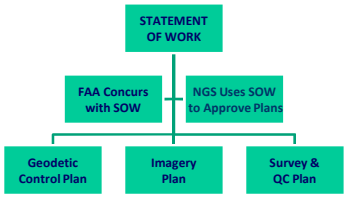
eALP (Robust Data Collection) | Feature List Example

Feature	Attribute	Source	Provider	Converted By	Enumeration	Data Type
Aircraft Gate Stand		Planimetric	Aerometric	AECOM		
	name	Facility Info	HRL	AECOM		VARCHAR2 (30 Byte)
	identifier	Calculated	System			INTEGER
	description	Facility Info	HRL			VARCHAR2 (255 Byte)
	gateStandType	Facility Info	HRL		codeGateStandType	VARCHAR2 (50 Byte)
	status	N/A			codeStatus	VARCHAR2 (50 Byte)
	wingspan	Facility Info	HRL	AECOM		NUMBER (38,3)
	length	Facility Info	HRL	AECOM		NUMBER (38,3)
	width	Facility Info	HRL	AECOM		NUMBER (38,3)
	userFlag	N/A				VARCHAR2 (254 Byte)
	pavementClassificationNumber	CADD	HRL	AECOM		NUMBER (38)
	jetwayAvailability	Facility Info	HRL	AECOM		INTEGER
	towingAvailability	Facility Info	HRL	AECOM		INTEGER
	dockingAvailability	Facility Info	HRL	AECOM		INTEGER
	groundPowerAvailability	Facility Info	HRL	AECOM		INTEGER
	surfaceType	CADD	HRL	AECOM	codeSurfaceType	VARCHAR2 (50 Byte)
	surfaceCondition	Facility Info	HRL	AECOM	codeSurfaceCondition	VARCHAR2 (50 Byte)
	Alternative	N/A				INTEGER

Airports GIS | Statement of Work

FRAMEWORK

- FAA/Airport Agreement (What)
- Written from Airport Perspective
- Not Consultant Scope of Services
- NGS Compares Plans to SOW
- See Online Help Templates
- Pre Coordinate with Proj. Mgr.



COMPONENTS

- Background & Objective
  - RW extension (with or w/o safety-critical data)
- Requirements
  - Plans
- Geodetic Control
- Imagery
  - Survey & QC; features; as-builts
- Graphic

SOW | Basics

Administrative

Date: October 6, 2009

Prepared for: Somewhere International Airport (XXX), Somewhere, NM

Airport Contact: Ms. Airport Contact
Planning Director
1234 Airport Drive
Somewhere, NM, XXXXX
Ph: 800.555.5555
airport.contact@Somewhere.org

Prepared by: G. Thomas Wade
Federal Aviation Administration
2601 Meacham Blvd.
Fort Worth, TX 76137-0610
Work: 817.222.5613
Thomas.Wade@faa.gov

Planned NTP: December 1, 2009
Estimated Completion: September 30, 2010

Objectives and Background

The project objective is to extend Runway 3/21 by approximately 1,000 feet to 7,500 feet and add a full parallel taxiway. The extension will be to the RW 21 end. A vertically-guided obstruction survey will be conducted to develop LPV approaches to both ends with a desired decision altitude of 250 feet and visibility minima of ¾ mile. The imagery will be acquired while the construction effort is in the grading and drainage phase. In a future A-GIS project, the imagery will be used to map the airport to produce an ALP.

Other information potentially included in Objectives and Background could include information on approach light PAPI or REIL relocation, instrument approaches, utilities and environmental.

Requirements

AC 150/5300-16A "General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey."

AC 150/5300-17B "General Guidance and Specifications for Aeronautical Surveys: Airport Imagery Acquisition and Submission to the National Geodetic Survey."

AC 150/5300-18B "General Guidance and Specifications for Aeronautical Surveys: Airport Survey Data Collection and Geographic Information System Standards."

AC 150/5300-13, through Change 14 "Airport Design"

Data providers should make maximum use of existing data for the airport which is traceable to the source to meet the requirements of this SOW before undertaking additional data collection. Data collected or proposed for use in a project must meet the tolerances specified in the above Advisory Circulars at the 95 percent confidence level (RMSE) before being used in the project or as part of the required deliverables.

The Consultant will submit all data collected and associated required deliverables in the format(s) specified as outlined in the appropriate advisory circular to the sponsor/proponent who will ensure the data is submitted to the FAA Office of Airports, Airport Surveying-GIS Program. All data submissions to the FAA will be through the Airports-GIS website at https://airports-gis.faa.gov/

The Consultant will submit weekly project status reports on the project through the program web site. The reports will contain progress updates and any significant issues with the project including deviations from the planned schedule.

The Consultant must submit, via the A-GIS website and have approved by the FAA/NGS the following required implementation plan(s) prior to commencing fieldwork.

Imagery
Survey and Quality Control

Geodetic Control Plan "Required" only if establishing PACS/SACS

The Consultant will submit final report for each plan as required in respective advisory circular.

SOW | Basics (continued)

Geodetic Control

This project will use existing PACS/SACS. If existing PACS/SACS are det
will be revised to either re-establish or use temporary control.

Imagery

The consultant will coordinate with the Airport Traffic Control Tower (ATC
mission and access to the ATCT and FAA Technical Operations for access t

Per AC 5300-17B, imagery will show full leaf coverage.

Color Film to be used: Kodak 2444 or AGFA X-100, or better

The following Flight Missions will be performed:

Flying Height	Area	Photo scale	Ground Sample Di
8,000' AGL	A	1" = 800'	12 inch
2,000' AGL	B	1" = 200'	3 inch

A – Entire project area as shown in illustration
B – All Airport Property including 6,000' off the ends of Runway 3/21 (VG

Rectified orthoimagery will be submitted for both flight missions.
Deliver data and information to NGS per 150/5300-17B, Paragraph 20.
Data will be delivered to FAA per 150/5300-17B, Paragraph 22

Survey and Quality Control

The Obstructions Survey will collect all attributes for safety-critical features.

Conduct Airport Survey and Analysis:
- Runway 3/21 in accordance with runways with Vertical Guidance (-13B, Section 2.7.1)
- Runway 8/26 in accordance with runways without Vertical Guidance (-13B, Section 2.7.3)

Validate Runway end (displaced threshold) position and elevation against existing FAA/NGS data:
- Runway 3/21
- Runway 8/26

Validate the following electronic and visual on airport NAVAIDS:
- RW 3 Glideslope, Localizer, PAPI
- RW 26 PAPI

Validate the following off airport NAVAIDS:
- VOR1234 approximately 1/2 mile SE of Airport

Collect the following runway Profiles:
- Runway 3/21 Centerline and 10 foot centerline offsets at 10-foot stations
- Runway 8/26 Centerline at 50-foot stations

Develop 1-foot elevation contours for entire airport

Validate Airport Elevation

Validate/Determine Airport Reference Point

Submit planned Runway 3/21 centerline extension profile at 10-foot stations and proposed Runway 21 end latitude, longitude and elevation, then after runway has been constructed validate plan data and submit actual values to FAA via A-GIS Website.

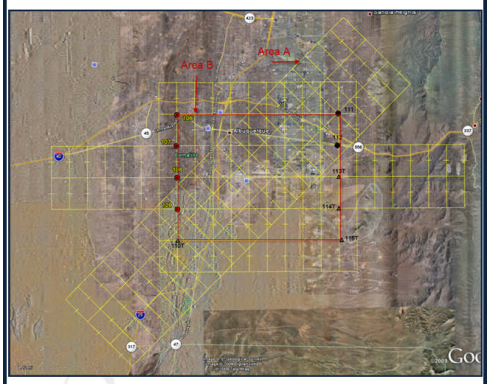
Scope could include:
- Conduct obstruction analysis for runways(s) for One Engine Inoperative Surface (Air Carrier departures) Required aster 1/1/2010 per AC 150/5300-13, Change 8
- Validate/Determine and document horizontal stopways
- Determine/Validate stopway profile
- Determine objects penetrating Clearway(s)

If Cat II/III operations are conducted on the runway additional requirements apply

SOW | Basics (continued)

Illustration

Project area flight missions.



Example Illustration

Implementation Plans

- An expansion of Statement-of-Work
- How Requirements will be met
- SOW touches on Geodetic Control, Imagery, and Airport Survey
- Plans support the Statement of Work and expand detail

Plan Overview

- **GEODETIC CONTROL PLAN**
  - Requirement of AC-150/5300-16A
  - **Required when establishing new PACS/SACS**
  - Details methodology for establishing PACS/SACS
- **IMAGERY PLAN**
  - Requirement of AC-150/5300-17B
  - Submission/Approval required before acquisition
  - Acquisition report if deviating from Imagery Plan
  - Details methodology for Imagery Acquisition and Use
- **SURVEY/QUALITY CONTROL PLAN**
  - Requirement of AC-150/5300-18B
  - Required for any survey project initiated through Airports GIS
  - Submission/Approval required before project commencement
  - Details methodology for data acquisition and quality control

Plan Overview (continued)

- **THE STATEMENT OF WORK SETS UP THE PLOT OF THE STORY**
  - SOW explains WHAT the Airport are going to do
- **THE PLANS EXPAND ON THE "WHAT" AND ADD THE "HOW"**
  - Explains in further detail what you are going to do
  - Explains the consultant/contractor methodologies in detail
- **ADVISORY CIRCULAR REQUIREMENTS**
  - What are the AC requirements for the particular project?
  - How do the methodologies adhere to the AC requirements?
  - How do the methodologies ensure required accuracies?
- **TOGETHER, PROJECT PLANS TELL THE STORY FROM BEGINNING TO END**
  - Provides background and purpose
  - Provides a timeline
  - Provides a work plan
  - Defends methodologies and ties to Advisory Circulars

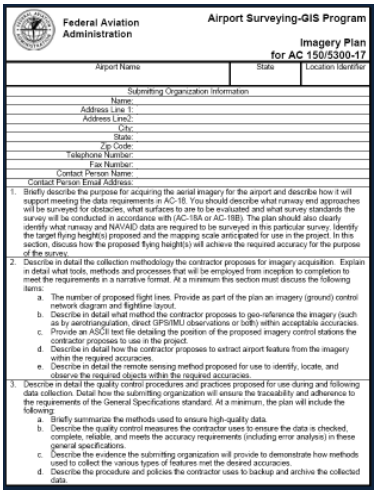
What information is NGS looking for?

- **GEODETIC CONTROL PLAN**
  - Existing NGS monuments and reconnaissance
  - Observation Scheme
  - Methodologies and GPS observation requirements of 16A
  - All monument recovery documentation
- **IMAGERY PLAN**
  - Discuss purpose of the imagery
  - How do your chosen photo scales ensure required accuracies will be met?
  - Demonstrate your understanding of 17B requirements
  - Overview of processing and quality assurance procedures
- **SURVEY/QUALITY CONTROL PLAN**
  - Remote Sensing, Field Survey or both?
  - Collection Methodologies for Field Survey
  - Extraction methods for Remote Sensing
  - Emphasis on safety-critical data (obstructions, runways, NAVAIDs)
  - If using both remote sensing and field survey, how will you combine this data?

Creating Custom Plan Templates

- **NGS/FAA SAMPLE TEMPLATES**
  - Available at https://airports-gis.faa.gov
- **DEVELOP CUSTOM PLAN TEMPLATES**
  - FAA templates create a great base
  - Initial time investment, but streamlines plan-writing process
  - Customize depending on the type of project
- **COVER ALL AREAS CALLED OUT IN ADVISORY CIRCULARS**
  - Geodetic Control Plan (AC-16A, Section 8.3)
  - Imagery Plan (AC-17B, pages 3-7)
  - Survey/Quality Control Plan (AC-18B, Section 2.6.2)
- **INCLUDE SOURCE OF PLAN INFORMATION**
  - Planning
  - Project Management
  - Quality Assurance
  - Field Surveyors

Basic Airports GIS templates are available on-line



Federal Aviation Administration — Airport Surveying-GIS Program

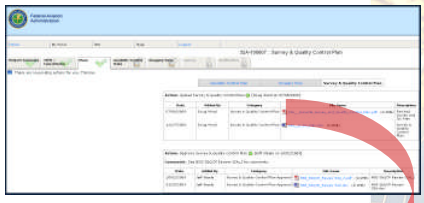
Imagery Plan for AC 150/5300-17

Airport Name	State	Location Identifier

Submitting Organization Information

Name:
Address Line 1:
Address Line2:
City:
State:
Zip Code:
Telephone Number:
Fax Number:
Contact Person Name:
Contact Person Email Address:

1. Briefly describe the purpose for acquiring the aerial imagery for the airport and describe how it will support meeting the data requirements in AC-18. You should describe what runway end approaches will be surveyed for obstacles, what surfaces to are to be evaluated and what survey standards the survey will be conducted in accordance with (AC-18A or AC-18B). The plan should also clearly identify what runway and NAVAID data are required to be surveyed in this particular survey. Identify the target flying height(s) proposed and the mapping scale anticipated for use in the project. In this section, discuss how the proposed flying height(s) will achieve the required accuracy for the purpose of the survey.
2. Describe in detail the collection methodology the contractor proposes for imagery acquisition. Explain in detail what tools, methods and processes that will be employed from inception to completion to meet the requirements in a narrative format. At a minimum this section must discuss the following items:
   a. The number of proposed flight lines. Provide as part of the plan an imagery (ground) control network diagram and flightline layout.
   b. Describe in detail what method the contractor proposes to geo-reference the imagery (such as by aerotriangulation, direct GPS/IMU observations or both) within acceptable accuracies.
   c. Provide an ASCII text file detailing the position of the proposed imagery control stations the contractor proposes to use in the project.
   d. Describe in detail how the contractor proposes to extract airport feature from the imagery within the required accuracies.
   e. Describe in detail the remote sensing method proposed for use to identify, locate, and observe the required objects within the required accuracies.
3. Describe in detail the quality control procedures and practices proposed for use during and following data collection. Detail how the submitting organization will ensure the traceability and adherence to the requirements of the General Specifications standard. At a minimum, the plan will include the following:
   a. Briefly summarize the methods used to ensure high-quality data.
   b. Describe the quality control measures the contractor uses to ensure the data is checked, complete, reliable, and meets the accuracy requirements (including error analysis) in these general specifications.
   c. Describe the evidence the submitting organization will provide to demonstrate how methods used to collect the various types of features met the desired accuracies.
   d. Describe the procedure and policies the contractor uses to backup and archive the collected data.



DANVILLE MUNICIPAL AIRPORT, DANVILLE, AR. AL-10188/32A
DELIVERABLE: Survey and Quality Control Plan (S&QCP)
SUBMITTED BY: Aerial Data Service, Inc.

The S&QCP is approved. The plan was concisely written, but is missing a couple pertinent details. NGS made the following observations during their review and recommends addressing these issues when proceeding with the survey.

NAVIGATIONAL AID DATA (Pages 1&4):
-NGS is concerned about the contractor surveying all of the required NAVAIDs. The contractor should seek assistance from the FAA and Airport Authority that would be vital in identifying any additional NAVAIDs that have been recently constructed and/or planned for construction or relocation. This assistance will be particularly important in identifying NAVAIDs located off the airport property and within 10 nautical miles or NAVAIDs that are somehow unique.
(See AC-150/5300-18B // Chapter 5 // 5.10. NAVIGATIONAL AIDS)

SURVEY EQUIPMENT (Page 6):
-The list of equipment, submitted by the contractor, to be used for the survey does not include the following: Calibration Reports and Maintenance Reports. (Refer to AC 150/5300-18B, Section 2.6.2.2.)

Lessons Learned/Best Practices

- The SOW is the foundation – make sure it's complete!
- Must include runways ends/profiles for all runways even if only one runway is being evaluated in order to calculate ARP and Airport Elevation
- Using Templates (SOW and Plans) improves the chance of success – Greatly making everyone's life easier
- Consultants should understand SOW requirements when negotiating Scope of Services with Airport
- Persons responsible for plans should have input into SOW
- For "eALP" projects – A thorough Scoping exercise with Sponsor, Consultant and FAA is critical to ensure agreement and develop a good cost model.

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