



Land Survey Handbook

**Division of Realty
National Wildlife Refuge System**

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LAND SURVEY HANDBOOK

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Chapter 1

Introduction

1.1 What is the purpose of the *Land Survey Handbook*? The *Land Survey Handbook* establishes procedures and guidance on cadastral surveys and other land survey services required for the management, acquisition, and disposal of U.S. Fish and Wildlife (Service) lands. The guidance in this handbook describes the general procedures for the most common types of work Service land surveyors encounter throughout the year. Due to the nature of survey work and the many different possible scenarios, the handbook does not provide procedures for all scenarios or land tenure found throughout the United States and its territories. The job of the Service land surveyor is to follow the general guidelines in this handbook and adapt their survey situation to meet the intended outcome, while abiding by the applicable Federal and State laws and the Service policies and guidelines in Part 343, Cadastral Surveys and Maps.

The National Wildlife Refuge System (NWRS) survey team will update this handbook as needed as policies, professional practices, and technologies change.

1.2 What are the objectives of this *Land Survey Handbook*? This handbook provides the procedures and guidance to the Regional Land Surveyors (RLS) and staff to perform the Survey Tract Review, cadastral surveys, and other land survey services necessary to support the mission of the Service. The handbook also provides land surveyors an overall view of the types of work they must perform, the general procedures they must follow, and the expectations the Service has for their work. It's also intended to serve as a training guide.

1.3 What is the scope of the *Land Survey Handbook*? The *Land Survey Handbook* covers procedures for land surveys on Service lands. Service lands are any lands where the Service holds fee title, partial interest, or is in the process of acquiring such an interest. Service land surveyors may also support Service programs on non-Service lands.

Chapter 2

Authority and History

2.1 Authority and History. Cadastral surveys for the Service are either authorized under Federal or State authority. Before a Service land surveyor begins any survey, he/she/they must determine what the authority is for the survey. Some cadastral surveys can be conducted under either authority, but usually one is better than the other, and they should not be mixed. Sections 2.2 and 2.3 of this handbook provide guidance on when to use Federal or State authority, and if you can use either authority, whichever is best.

The Federal authority for Service land surveys derives from two sources: the Migratory Bird Conservation Act, 16 U.S.C. 715 et seq., and 43 U.S.C. 2, Duties Concerning Public Lands. The Migratory Bird Conservation Act gives the Secretary of the Interior authority to acquire or lease lands for migratory waterfowl purposes and do all things and make all expenditures necessary to secure safe title. 43 U.S.C. 2 provides that: "The Secretary of the Interior or such officer as he may designate shall perform all executive duties appertaining to the surveying and sale of the public lands of the United States." The Secretary has delegated authority to the Service (National Wildlife Refuge System - Division of Realty) to perform cadastral surveys and mapping through 142 DM 3.

Land surveys conducted under State authority are subject to the laws of the State in which the land is located. For a Service land surveyor to operate under State authority, he/she/they must have licensure in that State to practice land surveying. Whether surveying private land under State or Federal authority, your survey decisions are governed by State statute and common law regarding real property ownership. Because of this, we encourage surveying under State authority and will pay for the surveyor's examinations and licensing in all states in the surveyor's Region where surveys are needed.

2.2 Federal Authority Cadastral Surveys

A. Cadastral surveys authorized under Federal authority:

- (1) Dependent resurveys of public domain lands withdrawn for a National Wildlife Refuge or Service administration site, and
- (2) Cadastral surveys on acquired lands or lands that we plan to acquire, although we recommend using State authority on acquired lands as State laws apply to private lands.

B. Cadastral surveys not authorized under Federal authority:

- (1) Original cadastral surveys of the public domain lands, unless acting under authority of the Bureau of Land Management (BLM) (see 757 DM 2, Surveying and Mapping), and
- (2) Cadastral surveys required for a U.S. patent (conveyance of public domain lands to private party), unless acting under authority of BLM (see 757 DM 2).

2.3 State Authority Cadastral Surveys

A. Cadastral surveys authorized under State authority:

- (1) Dependent resurveys of public domain lands withdrawn for Service administration,

- (2) Cadastral surveys of acquired lands or lands that we plan to acquire, and
- (3) Subdivision of acquired lands.

B. Cadastral surveys not authorized under State authority:

- (1) Original cadastral surveys of public domain lands, and
- (2) Surveys required for a U.S. patent on public domain lands.

C. The advantages of using State authority for land surveys are:

- (1) Most states have recordation laws, so the survey plats/maps produced are officially recorded/filed in a public record system and are easier for other licensed land surveyors and the public to obtain, and
- (2) State authority surveys may be required as a part of a land division application, which is often required for partial acquisitions.

2.4 Authorities for Land Surveying

A. 43 U.S.C. 2. Verbatim: “The Secretary of the Interior or such officer as he may designate shall perform all executive duties appertaining to the surveying and sale of the public lands of the United States, or in anywise respecting such public lands, and, also, such as relate to private claims of land, and the issuing of patents for all grants of land under the authority of the Government.”

B. 43 U.S.C. 52. Verbatim: “The Secretary of the Interior or such officer as he may designate shall engage a sufficient number of skillful surveyors as his deputies, to whom he is authorized to administer the necessary oaths upon their appointments. He shall have authority to frame regulations for their direction, not inconsistent with law or the instructions of the Bureau of Land Management, and to remove them for negligence or misconduct in office.”

C. The Migratory Bird Conservation Act (16 U.S.C. 715 – 715r) provides the funding authority for us to acquire or lease lands for migratory waterfowl purposes and do all things and make all expenditures necessary to secure safe title.

D. The Presidential Reorganization Plan No. II of 1939 (53 Stat. 1431) transferred the Bureau of Biological Survey and its functions from the Department of Agriculture to the Department of the Interior.

E. The Presidential Reorganization Plan No. III of 1940 (54 Stat. 231) consolidated the Bureau of Fisheries and the Bureau of Biological Survey and their functions into one agency within the Department of the Interior—the U.S. Fish and Wildlife Service.

F. The Migratory Bird Hunting and Conservation Stamp Act (16 U.S.C. 718-718h) provided the funding authority for us to acquire lands for conservation purposes.

E. The National Wildlife Refuge System Administration Act (16 U.S.C. 668dd – 668ee) provides guidelines and directives for administration and management of all areas in the National Wildlife Refuge System (NWRS).

G. The Brooks Act (Pub. L. 92-582, 86 Stat. 1278), which amended the Federal Property and Administrative Services Act of 1949, establishes Federal policy concerning the selection of firms and individuals to perform architectural, engineering, and related services for the Federal Government.

H. 757 DM 2, Surveying and Mapping, and the Manual of Surveying Instructions (2009 edition) provide requirements and instructions for Departmental cadastral surveying.

I. 142 DM 3, U.S. Fish and Wildlife Service, establishes that the Service's Division of Realty in the National Wildlife Refuge System provides central coordination and direction of all activities relating to the acquisition and disposition of lands and interests for the NWRS and the National Fish Hatchery System. "The Division performs ... cadastral surveys and mapping, processes land and mineral applications, and performs other actions associated with land acquisition ..."

J. 600 DM 5, Standards of Boundary Evidence provides managers of Federal interest assets with the means to effectively apply boundary evidence to protect assets.

K. State and territory land survey licensure laws and standards provide the requirements and instructions for conducting surveys on private lands under State authority.

2.5 History of the Service's Land Survey Program

The Service's Realty program was initially created to acquire lands for the preservation of migratory bird habitat, as authorized by the Migratory Bird Conservation Act of 1929. At that time, the NWRS was administered by the Bureau of Biological Survey (BBS) in the Department of Agriculture. The land surveyors and cartographers in the Surveys and Maps Section, Division of Land Acquisition, worked with Realty Specialists and Appraisers to establish over 140 National Wildlife Refuges between 1929 and 1941.

The Reorganization Plan II of 1939 transferred the BBS and its functions to the Department of the Interior, and in 1940 the BBS and the Department of Fisheries were combined to form the U.S. Fish and Wildlife Service. The land surveyors and cartographers were moved to the Division of Management, Branch of Engineering, in about 1950, and that part of the Service was renamed the Bureau of Sport Fisheries and Wildlife in 1956. The survey program was finally moved back to the Division of Realty in the Refuges Program in about 1974, at the same time that the Bureau of Sport Fisheries and Wildlife was re-named the U.S. Fish and Wildlife Service.

The oldest known Manual documenting Service Cadastral Survey and Mapping procedures was the Manual of the Division of Land Acquisition, produced by the BBS in about 1936. Developed by Arthur Reimer, Chief of the Surveys and Maps Section, this Manual described in detail how to record and index field notes, the types of monuments to set, mapping standards, how to hire temporary employees, and how to set up camp. Section 6473 of the Manual explained the tract numbering convention, which remains essentially unchanged today. The Manual was distributed in a loose-leaf binder so that pages could be replaced as needed, and was in use until at least 1950. It was later included in the Engineering Handbook of the Bureau of Sport Fisheries and Wildlife, and finally in the U.S. Fish and Wildlife Service Realty Manual, 1983. The Land Survey Manual was first published online (343 FW 1 and 343 FW 2) in 1995, and was revised concurrently with the creation of this Handbook in 2014.

Chapter 3

Organization and Administration

3.1 Organization and Administration. The Service land surveyors consist of a Chief Land Surveyor located in the Headquarters office, Regional Land Surveyors (RLS), and staff land surveyors located in each Region. The land survey program is organized in the Division of Realty under the Chief of the National Wildlife Refuge System (NWRS). The Chief Land Surveyor reports to the Chief, Division of Realty. In each Region, the RLS and staff land surveyors are organized within the Division of Realty for that Region. The RLS reports to the Regional Realty Officer, and in most Regions the staff land surveyors report to the RLS.

3.2 Duties.

A. Chief Land Surveyor. The Chief Land Surveyor oversees all land survey activities relevant to the Division of Realty land acquisition program and boundary management on Service lands. The Chief Land Surveyor is responsible for national policy interpretation and Servicewide policy formulation, managerial leadership and technical guidance, program implementation and evaluation, and internal and external coordination necessary for the successful management of the survey program. As needed, the Chief issues technical and procedural program guidance to ensure adequate technical support and proficiency, provides the final interpretation for the Service Manual regarding cadastral surveys, and assists the Office of the Solicitor and the Department of Justice in preparing the technical and legal portions of litigation involving cadastral surveys on Service lands.

The Chief Land Surveyor also acts as the consulting specialist for the cadastral survey program on related activities between the Service and other Federal, State, tribal, and private entities, and represents the Service on the Interagency Cadastral Coordination Council (ICCC).

B. Regional Land Surveyor (RLS). The RLS is responsible for all cadastral surveys of Service lands within his/her/their Region, and for the development and administration of the Region's land survey program. The RLS is responsible for Regional policy interpretation, managerial leadership and technical guidance, program implementation and evaluation, and internal and external coordination necessary for the successful management of the Region's survey program. This includes supporting land acquisitions, realty management, water rights acquisition, construction, and boundary management. He/she/they plans the workload and program budget, estimates survey project time and cost, and performs Survey Tract Reviews, boundary surveys, and other land survey services. Other duties include Certified Department of the Interior Land Surveyor (CILS) responsibilities, acting as the Contracting Officer's Representative (COR), and representing the Region and the Service as an expert witness on land survey matters in Federal court, the Federal Civilian Board of Contract Appeals, and the Interior Board of Land Appeals.

The Chief Land Surveyor may ask the RLS to assist on national committees with responsibility for defining standards, techniques, and methods for complex technical and scientific land surveying issues.

3.3 Recruitment and Professional Development. The Service encourages professional advancement and the pursuit of excellence for the surveying staff, which can be enhanced through professional affiliations. Membership in national and local societies is not required, but is highly recommended. Professional societies are an excellent source of information for legal and technical issues in the surveying and mapping disciplines. In addition, they provide a forum for exchange of ideas, concepts, and techniques. We encourage all survey and mapping personnel to attend at least one annual professional society meeting, as well as to present papers as part of their attendance.

3.4 Administration. The RLS, in coordination with the Regional Realty Officer and other program leads, will develop an Annual Work Plan (AWP) for the next year's planned projects. Because of the nature of the acquisition process and shifting priorities, knowing exactly which projects will be requested during the following year is impossible. Therefore, the RLS must make a prediction about which projects will move

forward and develop a project plan, while remaining flexible so he/she/they can shift work as projects are cancelled or added or priorities change. To predict the next year's projects and ensure orderly planning and budgeting, the RLS should meet with the program leads that typically require survey services to determine their priority projects. These meetings should take place well in advance of submitting the Preliminary Target Allocation (PTA) to Headquarters. Early planning helps us to fund and schedule surveys for completion in a timely manner and meet the needs of the requesting programs. We charge the costs of surveys to the requesting program/division unless previous arrangements are made to accumulate costs in a clearing account for reimbursement, or they are included in the current AWP budget.

A. Funding for land survey services typically comes from one of three sources: Migratory Bird Conservation Fund (MBCF), Land and Water Conservation Fund (LWCF), or appropriated funds. The RLS must coordinate with the Realty Specialists to determine the funding source(s) for a given project. The RLS then develops a time and cost estimate for those projects planned for the next year. The estimates are provided to the Realty Officer in time for inclusion in the PTA, which is usually in the month of May for next year's budget. They eventually make their way into the AWP. The following table shows the funding sources for each type of project.

		Survey Tract Review		Acquisition Survey		Boundary Management	
		In-house	Contract	In-house	Contract	In-house	Contract
Appropriated	Refuge Management					1261	1261
	Refuge Maintenance**					1262	1262
	Hatchery Maintenance**					1321	1321
MBCF	Small Wetlands Acquisition Program (SWAP) Administration	3110	3110	3110	3110		
	SWAP Purchase	3110	3110	3110	3110		
	Refuge Administration	3210	3210	3210	3210		
	Refuge Purchase	3210	3210	3210	3210		
LWCF	Projects		8422		8422		8422
	Land Acquisition Management	8451	8451	8451	8451	8451*	8451* 1261*
	Inholdings	8451	8451	8451	8451	8451* 1261	8451* 1261
	Emergency /Hardships	8451	8451	8451	8451	8451*	8451* 1261
	Exchanges	8454	8454	8454	8454	8451* 1261	8451* 1261

* These funds may only be used if a survey of the tract was not completed at the time of acquisition.

** Includes surveys required for construction and maintenance, including fencing.

B. The RLS determines the most efficient or responsive method of completing the survey depending on its type, timeframe, location, and scope. Depending on the situation, the survey may be conducted by:

- (1) In-house staff surveyors,
- (2) Contractors with a private survey firm, or
- (3) Another agency through an intra- or inter-agency agreement.

3.5 Boundary Management. Boundary management is the process of systematically evaluating, surveying, and marking high-priority boundaries; maintaining boundary infrastructure (survey monuments, posts, fences, etc.); and identifying and resolving encroachments and title claims. The goal of boundary management is to provide the field station manager with the visible and legally correct boundaries needed to both manage their resources and protect the property rights of the Service and adjoining landowners.

A. Boundary management is a responsibility the RLS shares with the field station staff and other Service employees. The components of boundary management are as follows:

1. *Inventorying the existing boundary conditions.* This is the responsibility of the RLS and includes compiling and indexing survey and corner records and boundary posting status, and putting them in a form so they can be retrieved and analyzed easily.

2. *Maintaining and protecting boundary posts and corner monuments.* The field station manager is responsible for monitoring the condition of the station boundaries. Field station staff should walk the boundary lines on a regular basis to determine the condition of the boundary. They should send a brief report to the RLS regarding the date of the inspection and the condition of the posts and monuments.

B. A 'Boundary Management Plan' can be very useful for field station managers to identify issues and for directing funding to the highest-priority projects. The plan should include an inventory of survey needs in priority order and a dated cost estimate.

C. The priorities for each field station are rolled up into a Regional survey priority list, which may be maintained by the RLS or the Refuge/Hatchery supervisors, depending on Regional policy. The list is used both for developing annual work plans and to take advantage of funding opportunities.

3.6 Cross Program Coordination.

While most survey work will be in support of the Refuge land acquisition and boundary management programs, the RLS must also be prepared to provide support to the many other Service programs that use or generate land survey information. In addition to the Realty program staff and field station managers, the RLS should become acquainted with the following program personnel:

Person	Role	Role/ Interaction
Refuge Facilities/Asset Coordinator	Maintains the 5-year Refuge Deferred Maintenance and Construction plans.	Provides cost estimates, especially of required cadastral surveys. See Chapter 8.
Hatcheries Facilities/Asset Coordinator	Maintains the 5-year Hatchery Deferred Maintenance and Construction plans.	Provides costs estimates, especially of required cadastral surveys. See Chapter 8.

Person	Role	Role/ Interaction
Division of Engineering (DEN), Regional Engineer and Staff	Serves as Project Manager for non-exempt and other construction/maintenance projects, including the management of the Dam Safety Program.	Conducts or contracts for cadastral surveys. Conducts, contracts, or provides technical standards for design surveys. Researches land ownership and consults on survey issues. See Chapter 8.
Refuge Roads Coordinator	Manages the Refuge roads and transportation program.	Provides boundary and control data and receives control and topographic data from road projects. See Chapter 8.
Refuge Inventory & Monitoring Lead	Manages and funds controlled mapping and other projects using survey instruments.	Provides survey technical standards or carries out control and evaluation surveys. Receives control and topographic data. Provides training and support for use of survey grade instruments. See Chapter 9.
Regional Water Rights Manager	Acquires and manages water rights for Refuges, Hatcheries, and other programs.	Provides support, technical assistance, or professional services for measuring water and acquiring State water rights. See Chapter 9.
Program Leads for <ul style="list-style-type: none"> • Partners for Fish & Wildlife • National Fish Passage Program • Coastal Program 	Administer partnership programs that fund habitat improvement, mostly on non-Service lands.	Provide technical standards, technical support and training, and control information. See Chapter 8.

3.7 Recordkeeping and Data Management

A. Records of Federal Authority Surveys. As part of our Federal survey authority, the Service is responsible for preserving the field notes, plats, and associated documents that form the official record of our surveys, and for providing copies of this information to the public. Even among the land survey community, it is not well known that the Service maintains a set of official survey records, and there have been needless mistakes and boundary conflicts on the part of private and other Federal land surveyors who did not have access to Service survey information. The RLS's responsibilities in regard to Service cadastral survey records are as follows:

1. Preserve original plats, field notes, and other information documenting the survey decisions as permanent Federal records.
2. File a copy of all Federal authority surveys with the local county or other recording office, and also in any State or local survey records databases. *Note:* not all State, county, or local governments record Federal records. If they don't, it's important to maintain a duplicate record of the survey in a secure and different location from that of the original document(s).
3. Create a filing system so that members of the public, including other land surveyors, may have easy access to the survey records. Ideally, staff other than land surveyors should be able to locate the correct information and provide it to the public.

B. Other Survey Records. As with Federal authority surveys, the records supporting State authority surveys must be preserved and provided to the public, whether carried out by Service employees or contractors.

1. A duplicate mylar copy of the recorded survey plat, the original field notes, and reports, correspondence, calculations, and other information sufficient to document the survey decisions should be maintained in a permanent file.

2. All permanent records should be scanned for security and for easy transmission to the public and customers.

3.8 Annual Reporting of Accomplishments. The RLS compiles annual reports at the end of each fiscal year for their Region's survey accomplishments. The reports are used to showcase our accomplishments, determine efficiencies and inefficiencies, and evaluate future year budget needs. The RLS must submit the report to the Chief Land Surveyor within 20 days of the end of the fiscal year, and it must contain:

A. Cadastral Surveys (Boundary)

(1) Number of miles of boundary survey completed on new boundaries by:

- (a) In-house survey crews,
- (b) Contract and vendor surveys, and
- (c) Other Federal agencies.

(2) Number of miles of boundary surveys completed for boundary maintenance (existing boundaries) by:

- (a) In-house survey crews,
- (b) Contract and vendor surveys, and
- (c) Other Federal agencies.

(3) Number of monuments set by:

- (a) In-house survey crews,
- (b) Contract and vendor surveys, and
- (c) Other Federal agencies.

B. Survey Tract Review:

- (a) Number of Survey Tract Review requests received, and
- (b) Number of Survey Tract Review reports completed.

C. Boundary Posting:

- (a) Number of miles of new boundary posted,
- (b) Number of miles of existing boundary posted, and
- (c) Number of posts set.

3.9 Land Status Mapping.

A. As the base layer of the Service GIS, the accuracy of the cadastral geodatabase is critical. It is becoming more so as tools such as Google Earth allow display of boundaries at a very large scale, overlaid with high-resolution aerial images.

B. Service cartographers and geographers create and maintain our cadastral geodatabase, which links the spatial location of Service-owned lands with the tabular land ownership data housed in the Land Record System. Where surveyed tract locations are not available, it is based on the best available spatial data, and is reviewed and approved for spatial accuracy by the RLS before it's finalized. In Regions where the cartographers are not supervised directly by the RLS, the cartographers and RLS need to work as a team to build and maintain the Regional boundaries.

Chapter 4

Land Acquisition

4.1 Land Acquisition. A primary function of land surveyors in the Service is to support our acquisition of lands. Fish and Wildlife surveyors play a key role in land acquisition, and must be familiar with all aspects of the process. Training for land acquisition comes from the Realty Academy and Realty Service Manual chapters, but the role of the surveyor is covered here.

This chapter gives a brief overview of the way we acquire land, and the role the land surveyor plays in the process.

4.2 The Land Acquisition Process.

The process of acquiring land for the United States of America is strictly governed by law and regulation, and is more or less uniform across all Federal agencies. The basic process and requirements are established by the Department of Justice (DOJ), which in turn has delegated oversight of land acquisition in the Department of the Interior to the Department's Office of the Solicitor.

Phase	Realty Actions	Potential Land Surveying Actions
Preliminary Land Acquisition Negotiations	<ul style="list-style-type: none"> Scoping the acquisition with landowner (What's for sale?) 	<ul style="list-style-type: none"> Consultations on time, methods, and cost
◆ Permission to Appraise Signed by Vendor		
Appraisal Phase	<ul style="list-style-type: none"> Order Title Insurance Commitment Order Survey Tract Review Order appraisal 	<ul style="list-style-type: none"> Land Survey Report
◆ Purchase Agreement Signed by Vendor		
Closing Phase	<ul style="list-style-type: none"> Certificate of Inspection (CIP) Title Curative Preliminary Title Opinion requested and received 	<ul style="list-style-type: none"> Field inspection Pre-acquisition boundary survey Boundary Assurance Certificate
◆ Closing – Deed Signed by Vendor		
Post-Acquisition	<ul style="list-style-type: none"> Final Title Opinion requested and received File closing and scanning 	<ul style="list-style-type: none"> Post-acquisition boundary survey Boundary posting Land status mapping Records management

A. Preliminary Land Acquisition Negotiations: During this phase, the field station manager and the Realty Specialist discuss with the landowner (vendor) how they plan to acquire the subject tract, which establishes a basic understanding about what would be offered for sale and what would be retained. The surveyor may be consulted informally during this phase regarding the legal description, known boundary issues, legal requirements for land division, etc.

B. Appraisal Phase: The acquisition project starts in earnest with the vendor signing a Permission to Appraise form. Based on this request, the Realty Specialist requests an appraisal from the Interior Office of Valuation Services, which in turn contracts with a private appraiser. The appraisal will establish the fair market value for the property, which is usually the purchase price that the Government is required to offer the vendor.

Before submitting an appraisal request, the Realty Specialist may order a preliminary Title Insurance Commitment, and the Land Survey Report for the property. However, we encourage Regions to order the Title Commitment and Land Survey Report during the appraisal phase for the following reasons:

(1) Some information developed for the Land Survey Report, such as correct legal description and a confirmation of legal access and acreage, is useful to the appraiser. Having that information at this stage may help you to avoid later rework of the appraisal.

(2) Methods, costs, and timelines for partial acquisitions, boundary and title problem resolution, and pre-acquisition boundary surveys are identified early in the process. This gives the Realty Specialist time to develop a realistic schedule and budget for the project.

C. Pre-Closing Phase: If the vendor accepts the Government's offer and signs an Agreement for the Purchase of Lands, the Government has the option of purchasing the tract. The Agreement is typically contingent on a number of items, including acceptable title and inspection. At this point, the Realty Specialist has a long series of tasks to complete before the sale can close.

(1) Besides ensuring that the purchase and survey funding is available, the Realty Specialist must:

(a) Obtain a Title Insurance Commitment with an acceptable legal description and acceptable title exceptions;

(b) Have the property inspected to ensure that there is no evidence of occupation or recent improvements that would give rise to either adverse claims or liens, and obtain or complete the Certificate of Inspection and Possession (CIP);

(c) Inspect the property for hazardous substances or other environmental problems;

(d) Relocate the occupants of the land, if necessary; and

(e) When everything is complete, the Realty Specialist requests a Preliminary Title Opinion from the Solicitor's Office along with permission to pay for the land.

(2) The surveyor's objective during the pre-closing phase is to support the Realty Specialist in acquiring a tract that is correctly described, has sufficient access, and is free of boundary or title defects. For a partial acquisition, we need to leave the vendor with a legally-created remainder tract. The surveyor's duties during this phase can include any of the following:

(a) **Land Survey Report:** If the Land Survey Report was not completed during the appraisal phase, it is completed now. The Land Survey Report may involve detailed research needed to clarify and resolve boundary or title problems. This can include records research, assembling a chain of title, field investigation, taking testimony, and preparing final legal descriptions and maps.

(b) **Land Division Surveys:** For a partial acquisition, some form of subdivision or boundary line adjustment usually needs to be approved by the local government. This typically involves preparation of applications and preliminary maps, followed by a cadastral survey and recorded map.

(c) Pre-Acquisition Cadastral Survey: The Land Survey Report may indicate that a cadastral survey is required to resolve issues of title or occupation.

(d) Certificate of Inspection and Possession (CIP): This is the formal report of inspection required by DOJ prior to issuing final title opinion. Although inspection is often carried out by a field station manager or Realty Specialist, surveyors are well-suited to perform this function.

(e) Boundary Assurance Certificate: When the problems or required actions that the Land Survey Report identifies have been resolved or completed and an adequate CIP has been obtained, the Regional Land Surveyor, in his/her/their role as a Certified Interior Land Surveyor (CILS), signs the Boundary Assurance Certificate, which he/she/they may include in the Preliminary Title Opinion request package.

D. Closing/Final Title Opinion Phase: When all items are in place, the vendor receives the funds and signs the conveyances, and the acquisition is considered closed. After closing, we request a Final Title Opinion from the Solicitor. When we receive the Final Title Opinion, we consider the tract to be fully vested in the United States. After closing, the surveyor may begin the post-acquisition cadastral survey if one was deferred to this time. It is Service policy that we monument and post all Service exterior boundaries adjoining private land. If a pre- or post-acquisition survey was conducted, the survey is provided to the cartographer for inclusion in the land status mapping system. If no survey was conducted, the RLS provides the best available depiction of the new tract boundary to the cartographer for inclusion in the land status mapping system.

4.3 Vendor Surveys. Vendor surveys are surveys of land that we plan to acquire that are performed by a private land surveyor, for which the vendor (seller) is seeking reimbursement from the Service.

A. Vendor surveys must be conducted in accordance with the chapters in Part 343, Cadastral Surveys and Maps, and this *Land Survey Handbook*, or meet the “Minimum Standard Detail Requirements for ALTA/ACSM Land Title Surveys,” including optional items as determined by the RLS.

B. The RLS must review and approve all vendor surveys. If the survey is not carried out according to the defined standards, the RLS rejects the survey.

C. Realty Specialists should coordinate vendor surveys with the RLS in advance to clearly establish standards and responsibilities before the vendor spends any money on the survey.

Chapter 5

Survey Tract Review

5.1 Survey Tract Review. Generally, the Survey Tract Review assures an acceptable legal land description and an official acreage for conveyance, and identifies the location of title exceptions and physical encumbrances on the land. The review is an essential part of securing clear title for the United States. It is the basis for how land we are acquiring is described in deeds to the United States and condemnation proceedings. The Survey Tract Review is completed in accordance with 600 DM 5, Standards for Federal Lands Boundary Evidence, and will return a completed and signed Land Surveyor Report and Boundary Assurance Certificate.

A. The RLS conducts the Survey Tract Review, which is an analysis of the title, surveys, and mapping information relating to the tract proposed for acquisition. The analysis gives the Realty Specialist an understanding of potential problems with the boundary or legal description. The review is typically completed in two steps: preparation of the Land Survey Report and the Boundary Assurance Certificate.

(1) The Land Survey Report identifies problems that need to be addressed prior to acquisition, and the timing and cost of any required surveys.

(2) The Boundary Assurance Certificate is completed when the title, legal description, and boundary are acceptable.

B. As we mention in section 4.2.B, the Land Survey Report may be completed during the appraisal phase or the pre-closing phase of the acquisition.

C. The Realty Specialist should request the Survey Tract Review using the Cadastral Survey Services Request immediately following the receipt of the preliminary title documents.

The following documents, which are generally included in the Title Insurance Commitment, are the documents the Realty Specialist should provide with the Cadastral Survey Services Request:

(1) The vesting deed for the subject property, and if the vesting deed is less than 10 years old, a partial chain of title going back 10 years,

(2) Each Schedule B document,

(3) The vesting deeds for all properties adjoining the subject property, and

(4) Any reference deed, document, or survey.

D. The RLS will complete, sign, and return the Land Survey Report to the Realty Officer. If requested, the RLS can complete the Certificate of Inspection (CIP).

E. The level of effort needed to complete the Land Survey Report depends on the type of acquisition, the character and value of the property, and the interests to be acquired. At a minimum, the Land Survey Report should consist of a prudent and diligent search and analysis of the land records associated with the tract. If the surveyor doesn't have all the relevant documents, he/she/they may need to obtain additional survey records from the local courthouse or obtain chains of title to provide an informed opinion on the boundary status of the tract.

(1) The Survey Tract Review process does not assure clear title, but will provide a certain level of confidence in the vesting deed and the condition of the tract boundaries. The Land Survey Report will report one of the following situations:

- (a) The [land description/land surveys] is/are acceptable for the stated purpose.
- (b) The [land description/land surveys] has/have potential problems; however, the risk appears minor and the action within the stated purpose should not be affected.
- (c) The [land description/land surveys] has/have potential problems and should not be used for the stated purpose. The following errors and/or concerns need to be corrected/addressed before this/these [land description/land surveys] should be used.
- (d) A boundary survey is required.

(2) The major components of a Land Survey Report are: (See Exhibit 1 for a detailed checklist.)

- (a) General Information - A description of the type of acquisition and documents used in the review.
- (b) Location and Physical Attributes – The general location of the tract and a check to see if the tract is situated within a unit boundary, such as a refuge.
- (c) Sufficiency of the Proposed Land Description – This explains whether the provided legal description is acceptable for the intended tract, if it closes mathematically, and if it is in harmony with the adjoining deeds.
- (d) Area – A description of what the area of the tract is for appraisal and purchase purposes.
- (e) Access – A description of what type of access there is to the tract and where it is located.
- (f) Exceptions – A statement of whether or not the Special Exceptions listed on the Title Insurance Commitment relate to the tract and if there are missing exceptions.
- (g) Encumbrances – A description of any encumbrances (unauthorized uses) and where they are located.
- (h) Boundary Status – A statement about whether the tract has been surveyed, and if there are any boundary conflicts with the adjoining parcels as determined from the records.
- (i) Survey – A statement of whether the tract needs either a pre-acquisition or post-acquisition survey.

5.2 Legal Descriptions. Because of the wide variety of land tenure systems and local practices found across the nation, we do not prescribe fixed formats for Service legal descriptions. This section provides basic principles to follow, which the RLS must adapt based on the local conditions.

A. General Principles. In general, legal descriptions should be accurate and concise, containing enough information to permit a surveyor to definitely locate the tract on the ground and to establish, or reestablish, its boundary lines and corners. In addition to the elements needed for definite location, the land surveyor should be certain the legal description:

- (1) Includes a general statement of location and a reference to the grantor's derivation of title (vesting deed reference).
- (2) Includes appurtenant easements, especially access easements.
- (3) Includes the tract number and the appropriate sub-tract number for each parcel in the description.

(4) Is identical to that listed in the Title Insurance Commitment that the United States receives on closing. If the surveyor intends to substitute a new description for the record description, the title officer of the company issuing the commitment will be consulted and an agreement reached on the description to use.

(5) Does not include exceptions for public roads or other corridors (e.g., "Except Roads") unless the road in question is definitely determined to be a fee right-of-way.

B. Types of Legal Descriptions. There are five general types of legal descriptions, three in the narrative form and two in the tabular form. The person preparing the description should use the form deemed most appropriate given the type of acquisition and configuration of the parcel. See Exhibit 2 for a checklist of items to consider when preparing a legal description. In some cases a legal description may contain one or more of these types.

(1) Narrative.

(a) *Metes-and-Bounds.* A series of lines around the perimeter of an area. "Metes" meaning bearings and distances, and "bounds" meaning and referring to monuments, both physical and legal. (See Exhibit 3 for an example of a metes-and-bounds description.)

(b) *Adjoiners.* A boundary description containing only references to the recorded deeds of the owners adjoining each boundary line of the property being described. This type of description should be used in conjunction with a metes-and-bounds or strip description. (See Exhibit 4 for an example of an adjoiners description.)

(c) *Strips.* Strip descriptions for rights-of-way for pipelines, roads, utility lines, railroads, etc. (See Exhibit 5a and 5b for an example of a strip description.)

(2) Tabular.

(a) *Public Land Survey System (PLSS).* Also called a rectangular description, this is a description of the parcel by State, township and range, and section, and may include aliquot, lot, parcel, or tract. (See Exhibit 6 for examples of PLSS descriptions.)

(b) *Lot and Block.* A lot and block description is one shown on a map of a recorded subdivision or parcel map. (See Exhibit 7 for an example of a lot and block description.)

C. Descriptions for Public Land Orders. Descriptions of public land prepared for publication must meet the format from the latest edition of the "Specifications for Descriptions of Tracts of Land for Use in Land Orders and Proclamations," U.S. Department of the Interior, 1979 edition or later, if replaced.

5.3 Tract Acreage Determination. The areas assigned to tracts are based on the returns of approved boundary surveys, and must be reported to a level of precision consistent with the underlying measurements, but not a greater accuracy than two decimal places. If there is no approved survey of the tract, and an area is needed prior to completion of an approved survey, such as for appraisal purposes, then the RLS may allow an estimated acreage according to what they determine to be the best available information. The Realty Specialist will notify the appraiser that the acreage is an estimate and subject to change. The estimated acreage is not official, and all calculations based on this area must be updated once the approved survey reports acreage. Typically, the estimated acreage is derived according to the following hierarchy:

A. Direct returns of, or calculations based on, recent surveys, deeds, or monument records.

B. Calculations based on a combination of surveys, deeds, and digitized occupation or riparian lines from recent aerial imagery.

C. County assessors' acreage.

5.4 Tract Numbering and Roman Numeral Tracts.

A. Tract numbers are alphanumeric symbols attached to each tract of land that we acquire. They form the key field for the Service's land ownership database. Since the surveyor is often called on to apply or check the tract naming and numbering rules, it is important to have a good understanding of the system. The rules governing naming of tracts and assigning tract numbers are given in the Realty Manual. The rules for assigning tract numbers to out-grants (rights-of-way and other permits) are given in 342 FW 3.

B. Land surveyors may find it necessary to segregate a portion of an existing tract for title reasons. When this happens, we may assign a Roman numeral to the segregated portion. For example, if Tract (10) is bisected by a road that is found to constitute a fee-owned strip of land, the larger sub-tract retains the (10) designation and the smaller can be designated Tract (10-I). These Roman numeral or "I (eye) Tracts" can only be created by land surveyors, and are a legacy of the era before computer mapping when surveyors had to work for months at a time without being in contact with the Realty office. However, Roman numerals are now used to indicate tracts where there is something unique and perhaps uncertain about the title to the tract. Examples include:

(1) Tidelands and shore-lands (below the mean high tide mark), especially those that may be subject to a State claim.

(2) The beds of rivers and lakes where navigability has not been adjudicated, or where the exact location of the boundaries has not been established.

(3) Lands subject to an adverse claim by others, or where our title is based on the adverse claim of our grantor.

C. Roman numeral tracts are unique in that they preserve the original designation of the sub-tract from which they are segregated. For example, normally if part of tract (10a) needs to be segregated from the rest of the tract, it is simply designated (10b). However, if the same part needs to be segregated for title reasons, it is given the designation (10a-I).

D. The use of Roman numeral tracts has not been consistent across all Regions, and it may take some research to understand what the assignment of the Roman numeral signifies.

5.5 Evaluating Tract Access. It is important that the type of access to the tract under review is carefully evaluated—in the short run it can affect the appraised value of the tract, and in the long run it may limit the type of management the Service can carry out.

A. Types of Access:

(1) Physical access: The evaluation of access starts with identifying the physical access to the tract. Based on field visits, aerial images, or conversations, how and where is the tract currently accessed? What public roads are used, and where are the driveway entrances, etc.?

(2) Legal access: The review then identifies whether the vendor has a written legal right to use the physical access. Just because the tract under review abuts a public road does not guarantee that there is safe and legal access. You should investigate limited-access provisions, and recommend that the Realty Specialist investigate whether the existing driveways are legal.

If the tract under review does not abut a public road, then an easement or permit is required to give the Service the right to cross the intervening land. In a best-case scenario, the existing legal description in the vesting deed or Title Commitment includes all appurtenant access easements. If it does not, this does not necessarily indicate a lack of legal access; appurtenant easements are conveyed along with the dominant tenement whether they are explicitly described or not. However, the title may need to be searched to positively identify their existence.

The review should cite the width of the easement, the type of use permitted (access, utilities), and any restrictions on the easement (time of year, administrative use only). All appurtenant easements should be explicitly described in conveyances to the United States, along with a reference to the instrument by which they were created, if applicable.

B. Obtaining Access:

If no easement or permit is located to cover the use of the current physical access to the tract, the Service has several options:

- (1) Reserve an easement through a portion of the vendor's remaining lands. This might involve new road construction.
- (2) Acquire an easement from the owners of the underlying land.
- (3) Consider whether the vendor has acquired a prescriptive easement based on long usage, and include language to that effect in the description.

Obtaining acceptable legal access is the responsibility of the Realty Specialist, but the land surveyor can assist.

C. Railroad Crossings: Any crossing of railroads or similar utility corridors should be legalized via a permit.

D. If an access easement or road maintenance agreement has any provision for payment of road maintenance expenses, be sure to highlight this in the review. The United States cannot accept a tract that has an open-ended financial obligation, such as for road maintenance expenses. Such agreements need to be made "subject to availability of appropriated funds."

5.6 Evaluating Encumbrances. An encumbrance is any claim against a property made by another party. We use this term to cover the entire range of possible claims, including:

- The lien of taxes and assessments,
- Recorded easements,
- Unrecorded or prescriptive easements,
- Mechanic's liens,
- Mineral rights, and
- Possible loss of ownership by erosion or by unwritten conveyance (adverse possession, etc.).

The Department of Justice Title Standards 2001 (4.b) say: "...The two most critical components of title evidence are 1) a search of the land records and 2) a physical inspection. Each can independently reveal evidence of possible claims of use or ownership. Both are essential to a review of the title."

The RLS, the Realty Specialist, and others on the land acquisition team need to work together to identify all encumbrances affecting the tract we are acquiring. This allows the Realty Officer to determine whether the encumbrances will impair the value of or interfere with the use of the tract. It also allows the Regional Solicitor to determine whether title is acceptable for conveyance to the United States and what curative actions may need to be taken.

Encumbrances are generally divided into two categories—Title Exceptions and Encroachments.

A. Title Exceptions are encumbrances that are not covered by title insurance. They are in “Schedule B” of the Title Insurance Commitment and Title Insurance Policy. There are two categories of title exceptions:

(1) General Exceptions apply to all properties, and include such items as rights of parties in possession, easements that would be disclosed by a survey or an inspection of the property, and the effect of any instrument recorded after the date of the title insurance policy. Generally, these exceptions are not subject to review because they are standard.

(2) Special Exceptions apply specifically to the tract under review. They can include the lien of taxes; the effect of recorded instruments such as easements, mortgages, and other agreements; and the effect of public roads. In riparian areas, there are always special exceptions relating to the possibility of erosion, accretion, avulsion, State claims based on navigability, and the public trust easement.

Both the Realty Specialist and the RLS are responsible for reviewing the special exceptions for a tract proposed for acquisition. The RLS can help by running out complex easement descriptions, identifying the potential riparian issues affecting a tract, and by simply being a second set of eyes on this important topic. Ultimately, the Realty Officer has to sign the Certificate as to Rights-of-Way and Easements (CROWE) certifying that the proposed title exceptions are administratively acceptable.

Our objectives in reviewing special exceptions are to:

- (a)** Identify and highlight exceptions that are unacceptable to the United States, or that will not allow us to manage the tract the way we need to.
- (b)** Identify special exceptions that do not affect the tract under review. It is common to find exceptions that refer to a nearby tract, or a part of the vendor’s property that is not proposed for acquisition.
- (c)** Add any recorded easements that affect the property and may have been missed by the title insurance company.
- (d)** Identify and map the location on the ground of easements, especially those that may not be in use or easily visible.

B. Encroachments. Encroachments are uses or occupations of the tract that are not authorized by any written grant or agreement, and can only be identified by aerial images, field inspections, or cadastral surveys. In the land acquisition process, encroachments are considered a type of encumbrance because, under certain conditions, use and occupation can become legal ownership. This is why it is so important to identify and investigate encroachments in the survey review process, and is one of the reasons why the Department of Justice mandates two field inspections (Certificate of Inspection and Possession - CIP) of the tract during the acquisition process.

Inspection of aerial images can identify obvious encroachments, such as private roads, utility corridors, structures, farming, or logging. Recorded surveys may contain valuable documentation of occupational encroachments affecting a tract. Field inspections can reveal lines of occupation, such as fences or ditches near a boundary. However, unless the boundary has been surveyed and monumented, the inspection will not reveal whether they represent encroachments. When you find these signs of occupation, it often triggers the requirement for a pre-acquisition cadastral survey.

5.7 Partial Acquisitions. Partial acquisitions are when the Service acquires only part of the vendor’s ownership. For example, the vendor may want to sell the undeveloped portion of their land and retain a small area around their residence. Since we want to leave the vendor with a legal remainder parcel that they can legally sell or develop as they wish, we generally follow State and local land division laws in

dividing the vendor's land. The land surveyor plays an important role in partial acquisitions, preparing maps and descriptions for land division applications, and advising the Realty Specialist on the process.

When reviewing a tract proposed for partial acquisition, the land surveyor needs to research the local or State land division requirements and obtain a reasonable estimate of the costs and time required to process an application. The Land Survey Report will identify the required process, the costs to prepare the application package (including the cadastral survey, if required), the fees charged by the public agency, and the estimated time required.

5.8. Field Inspection. Before completing the Boundary Assurance Certificate, the land surveyor, Realty Specialist, or field station staff member should carry out a thorough field inspection of the subject tract. The inspection should be completed early in the process and no later than after receiving a signed purchase, exchange, or donation agreement from the landowner. This is to identify the need for and allow time for a cadastral survey and any curative actions that may be necessary. The inspection may also serve as the first inspection for the Certificate of Inspection and Possession (CIP). During the field inspection, the responsible employee should:

A. Locate each corner of the tract and walk all of the tract boundaries that do not adjoin Service land or a natural boundary (such as a stream).

B. Locate, sketch, and describe any of the following:

- (1)** Lines of occupation such as fences, walls, or ditches along the boundaries;
- (2)** Roads or trails crossing onto the subject tract from adjoining properties;
- (3)** Overhead or underground utilities crossing the tract;
- (4)** Evidence of unauthorized uses such as logging, farming, and off-highway vehicle traffic;
- (5)** Location of any access easements;
- (6)** Evidence of recent construction or maintenance work; and
- (7)** The potential presence of hazardous substances or other environmental problems.

C. The Regional Land Surveyor must analyze the inspection results. If there are apparent encroachments or occupations that could be the basis for an adverse claim, he/she/they must recommend curative actions to the Realty Specialist (see 340 FW 4).

Chapter 6

Cadastral Surveys

6.1 Cadastral Surveys. A cadastral survey creates, marks, defines, retraces, or reestablishes the boundaries and subdivisions of land ownership. It is synonymous with “boundary survey.”

A. Cadastral surveys authorized for use by the Service are:

- (1) “Official cadastral surveys,” which are those surveys carried out in accordance with Part 343 and approved by the RLS (whether completed under Federal or State authority),
- (2) BLM or General Land Office (GLO) cadastral surveys, or
- (3) Cadastral surveys performed by another party, but determined acceptable for use by the RLS through the Standards for Federal Lands Boundary Evidence process.

B. *The Department of Justice Title Standards 2001* require cadastral surveys prior to an acquisition when:

- (1) Improvements to the land are contemplated, and
- (2) For all sites where the acquisition involves part of a larger property, and new boundaries are being created.

C. Cadastral surveys are required before the Service acquires land when:

- (1) The current legal description is unacceptable and cannot be resolved without a survey,
- (2) There is an occupational conflict on or near the acquisition boundary,
- (3) A determination of the area is needed for acquisition,
- (4) The tract borders non-Service lands where an active acquisition project is not in progress, or
- (5) It is a requirement of State, county, or local government law.

D. Cadastral surveys are required after acquisition when:

- (1) The tract was not surveyed at the time of acquisition;
- (2) The boundaries have become uncertain due to lack of maintenance, vandalism, or monument destruction;
- (3) There is a possible adverse claim or trespass;
- (4) The boundary has changed due to movement of water; or
- (5) New boundaries were created by the disposal or exchange of lands.

E. Cadastral surveys on public lands must be executed in accordance with the resurvey chapters of the current version of the BLM *Manual of Surveying Instructions* (chapters 5 through 8 of the 2009 Manual).

F. Cadastral surveys on acquired lands must be executed in accordance with the applicable laws of the State in which they are located. (Many states have adopted the BLM *Manual of Survey Instructions* for their rules on land surveying methods and procedures.)

G. BLM or the Service, under the authority of BLM, must conduct original surveys of the public lands and surveys required for a U.S. patent.

6.2 Steps of a Cadastral Survey.

A. Determine if a survey is needed: Typically a field station manager or Realty Specialist will discuss a potential cadastral survey with the RLS and come to an understanding on cost and timing.

B. Request for a survey: An authorized employee completes a Land Survey Services Request form to initiate a survey. Usually the RLS will help the requestor fill out the form. The form must be signed by a line officer with budget authority and sent to the RLS through the Regional Realty Officer.

C. Request received: The RLS reviews the request, determines the survey service needed, prepares a time and cost estimate, and completes the Land Survey Report portion of the form. The original signed form is kept in the official tract file, and a copy is sent to the surveyor assigned to the project.

D. Project Instructions (scope of work) prepared: The RLS prepares Project Instructions that define the scope of work and procedures to follow while conducting the survey. (See Exhibit 8 for example Project Instructions.) If the survey is contracted, the Statement of Work references the Project Instructions.

(1) The project instructions must include the following information:

(a) Title. "Project Instructions," *State, Region, and Refuge or administrative site.*

(b) Preliminary Statement. "To execute the surveys included under these instructions, the assigned land surveyor is authorized and directed to make the described examination, retracements, reestablishment of points of control, surveys, and resurveys set out in these instructions. The surveyor will be guided by the Service Manual, 343 FW 1 and 2, Cadastral Surveys and Maps (or the survey laws of the State of (insert state name)), and these instructions and any supplemental instructions that may be issued during the progress of work."

(c) Authority. Describe the nature of the survey, the party requesting the survey, date of the request, and the authority(s) under which the survey will be executed.

(d) Appropriation. Identify the work and funding source for that work, such as: "The costs of the field and office work incurred in the execution of the retracements, resurveys, and surveys described in these instructions are payable from funds made available from (funding source such as LWCF)."

(e) Limit and Character of Work. Describe the type of survey and lines to be surveyed. Because you often don't know the extent of control lines to be surveyed until retracements on the ground are made, it is best to include a statement that the retracement or resurvey of control lines is authorized providing it controls or defines the boundaries of the proposed or current Service lands.

(f) History of Surveys. List Service-approved surveys and other known surveys in the area of the subject tract. List the surveys in chronological order beginning with the earliest survey, and include the relation of the survey to the subject survey, the surveyor's name, and date the survey was conducted. If the survey was recorded or filed, provide the recording location, recording date, and record identification (book and page). This does not preclude the surveyor from conducting the "Additional Research" described in [section 6.2F](#) of this chapter.

(g) Method and Order of Procedure. Outline the general order in which the lines of the subject tract, including lines to controlling corners, should be surveyed, and which corners should be monumented. Identify unusual circumstances or precautions, but you do not have to describe regular survey practices (although you might want to reference the Service Manual (Part 343), this handbook, the BLM *Survey Manual*, or other reference guides.

(h) Diagrams and Supplemental Data. Prepare a diagram that shows the lines to be surveyed in dashed lines and the adjoining lines of previous surveys as solid lines.

(i) Survey Notes, Plats, and Reports. Include directions for reports, field tablets, and the preparation of the final survey plat. If you are going to require a survey report or diagram to be submitted at certain time intervals (weekly, monthly, etc.) or at certain milestones during the course of the survey, state that here. Provide instructions for returning the field notes, Project Instructions, and other records related to the survey for filing in the official tract file.

(j) Modification of Special Instructions. Direct the assigned surveyor to promptly report conditions that call for additional modified Project Instructions with a recommended procedure.

(2) The RLS approves the Project Instructions with his/her/their signature.

(3) During the course of the survey, new evidence or information may be discovered that makes the procedures, or portions of the procedures, in the Project Instructions incorrect or inapplicable, requiring amended or supplemental instructions. Prepare supplemental instructions if additional work is needed and amended instructions if portions of the work are no longer necessary. These instructions should just correct anything that's wrong in the original procedures and follow the same approval process as the initial Project Instructions.

(4) We file approved Project Instructions and any supplemental or amended instructions in the survey project file.

(5) The RLS gives a copy of the Project Instructions and any supplemental/amended instructions to the assigned surveyor along with any surveys and deeds of the tract and adjacent tracts and other pertinent information, including information provided by the Realty Specialist.

E. Assignment Instructions: A surveyor is assigned to conduct the survey.

(1) The RLS prepares Assignment Instructions to assign the survey to a land surveyor (GS-1373), or to a licensed or registered land surveyor contractor. (See Exhibit 9 for example Assignment Instructions.)

(2) The RLS approves the Assignment Instructions with his/her/their signature and gives them to the land surveyor.

(3) We file a copy of the Assignment Instructions in the survey project file.

F. Additional research: The assigned surveyor will perform additional research for sources of survey evidence that is related to the tract of land. Survey evidence includes information that tends to prove or

disprove the position of a property boundary. The assigned surveyor should consider such sources as local residents, absentee and former landowners, other land surveyors in the area, local records offices, and utility and transportation companies. The surveyor must document all searches in the field notes record.

G. Control survey: The assigned surveyor must establish a control network if one has not already been established for the site. The control network consists of high accuracy points, preferably on prominent boundary corners, such as township or section corners. The control point should also be easily accessible, and the monument must be permanent, legibly marked, firmly set, and preferably of the dig-in type. See measurement procedures, accuracy standards, and datums below.

H. Field survey. The assigned surveyor conducts the survey in accordance with the Project Instructions, Assignment Instructions, and the cadastral field procedures in this handbook with the goal of providing adequate protection for existing rights and proper boundary marking. To fulfill this task, the surveyor must analyze the record evidence and conduct an extensive on-the-ground search to recover evidence of previous occupation and surveys. Found evidence must be tied into the project control network, including lines of occupation along the boundaries surveyed. The surveyor must document this search in the field notes of the survey, including procedures of evaluation, physical description of the search area, a narrative of the search process, and the amount of time spent in the search process. The surveyor must then evaluate and analyze both the record evidence and field-recovered evidence to determine the correct location of the boundaries and set those boundaries on the ground.

(1) Field notes. The surveyor must keep physical field notes to serve as a permanent record so that the work performed can be recreated. Record field notes on loose leaf sheets or in bound notebooks. Your field notes should record all project field work, including corner search, field ties, and monumentation. Record each day's date and crew members, and note the weather conditions.

(a) For each control point, monument found, and monument set, the field notes must contain the following:

(i) General location, with approximate distances to prominent features to allow easy recovery;

(ii) Type and size (length, width, and diameter) of monument or other evidence found or set, with any cap markings, and the distance the monument is projecting above or below the surface of the ground;

(iii) Measurements to new or existing accessories (bearing trees, bearing objects, reference points) and a description of each accessory (size (diameter), type, markings, etc.);

(iv) Geographic Coordinate Database (GCDB) point identifier (see Exhibit 10 for a user's guide to survey point IDs) or a point number within a range assigned in the Project Instructions; and

(v) A sketch clearly showing the relationship of the points to each other and to surrounding physical/cultural features.

(b) The notes must include a description of the method and results of the corner search per (1)(a) as well as the names and testimony of any people with whom corner history and locations were discussed.

(c) All measurements must be recorded on paper or digitally. If you use digital data collection to record measurements, record the description and occupation data of all control points in the physical field notes record. The Project Instructions will specify any requirements for submittal of digital data collector files.

(d) Surveyors should reject all or part of the field notes if they include illegible notes or erasures on field notes sheets. Do not accept copied notes—only accept originals. If you reject any of the field notes, it may require resurveys of the rejected portions. It is acceptable to take corrections that are made by ruling out or lining out errors.

(e) All field notes must be properly indexed and cross-referenced.

(f) Three digital photos must be taken of each controlling corner and each monument set, with the point number and direction specified in the file name or otherwise. Explanations of the views described below are found in the “Requirements for Digital Photographs of Survey Control” published by the National Geodetic Survey, http://geodesy.noaa.gov/web/surveys/photo_submissions/.

(i) Close-up (taken vertically, so stamping is clear and legible),

(ii) Eye level (taken vertically, shows mark and area), and

(iii) Horizontal view(s), mark in foreground, feature(s) in background.

(2) Measurement procedures. You can make measurements to determine the direction and length of lines, geodetic positions, or elevation using Global Positioning System (GPS) or conventional equipment, such as a total station. The assigned land surveyor will determine the best equipment for the project, given the size, location, accuracy requirements, and other characteristics of the project. Conventional measurements must be based on closed traverse loops or on networks with redundant control points. As a general rule, found corners must be included within the main leg of a traverse loop; however, when this is not possible, you must verify corners observed outside the main leg by a side shot method check. Check side shots to control corners either by turning angles from two back sights or by closing the horizon. Analyze measurements either by compass rule or least-squares techniques to ensure no measurement blunders are present in the data. Accuracy standards are described below in section 6.2H.3. The reported bearing or azimuth must be oriented to either astronomic (true) or grid north (south, where applicable), and distances must be shown in decimal feet.

(a) Base GPS Real Time Kinematic (RTK) measurements on a control point that meets one of the following criteria:

(i) Published National Geodetic Survey (NGS) or other agency control point,

(ii) Positioned by an approved differential static GPS survey,

(iii) Positioned by two, 2-hour static occupations processed using the NGS OPUS system, or

(iv) Positioned by one 4-hour static occupation processed and published in the NGS OPUS database.

(b) GPS Real Time Kinematic (RTK) procedures must adhere to the NBG “User Guidelines for Single Base Real Time GNSS Positioning.”

(i) Depending on the level of accuracy required for a given project, the observer may select procedures for a lower, more appropriate RT Accuracy Class. See table below from the NGS Guidelines:

ACCURACY CLASS SUMMARY TABLE				
	Class RT1	Class RT2	Class RT3	Class RT4
Accuracy (To Base)	0.015 Horizontal, 0.025 Vertical	0.025 Horizontal, 0.04 Vertical	0.05 Horizontal, 0.06 Vertical	0.15 Horizontal, 0.25 Vertical
Redundancy	≥ 2 Locations, 4 Hour Differential	≥ 2 Locations, 4 hour Differential	None	None
Base Stations	≥ 2, In Calibration Project Control	Recommend 2 in Calibration	≥ 1, In Calibration	≥ 1, in Calibration Recommended
PDOP	≤ 2.0	≤ 3.0	≤ 4.0	≤ 6.0
RMS	≤ 0.01 M	≤ 0.015 M	≤ 0.03 M	≤ 0.05 M
Collection Interval	1 Second for 3 Minutes	5 Seconds for 1 Minute	1 Second for 15 Seconds	1 Second for 10 Seconds
Satellites	≥ 7	≥ 6	≥ 5	≥ 5
Baseline Distance	≤ 10 KM	≤ 15 KM	≤ 20 KM	≤ Any With Fixed Solution
Typical Applications	Project Control	Densification Control	Topography	Site Grading
	Construction Control Projects	Topographic Control	Cross Sections	Wetlands
	Check on Traverse, Levels	Photopoints	Agriculture	GIS Population
	Scientific Studies	Utility Stake out	Road Grading	Mapping
	Paving Stake out		Site Grading	Environmental

(ii) At the beginning of each RTK measurement session, carry out a system check by occupying an existing control point, either as defined above or by establishing it using the procedures in this section.

(c) GPS static procedures:

(i) Measure control corners using the average of two static baselines to a single control point as defined in item (b) above,

(ii) Fix baseline integers with low RMS error statistics, and

(iii) Process the static data collected at the base station using the OPUS system, and compare it with the control coordinate of that station.

(3) Accuracy standards.

(a) At a minimum, all survey measurements must conform to the accuracy standards established by the laws and regulations of the appropriate State, or the accuracy standards established by the National Society of Professional Surveyors (NSPS), whichever is most restrictive. The NSPS standards referred to are the *Model Standards of Practice*, adopted February 8, 2003. Section C, "NSPS Classification and Accuracy Standards for Property Surveys," lists the following:

Classification of Survey	Acceptable Relative Positional Accuracy at the 95 Percent Confidence Level
Urban	0.07 feet (21 mm) plus 50 ppm
Suburban	0.13 feet (40 mm) plus 100 ppm
Rural	0.26 feet (79 mm) plus 200 ppm

(b) As described in Section G of the NSPS standards, "Positional Accuracy Definitions and Procedures," these acceptable accuracies are comparable to the results of a correctly weighted least-squares adjustment, or twice the calculated linear error of closure of a compass-rule adjustment.

(c) If not otherwise directed in the Project Instructions, you must assume the standards for “rural” surveying.

(d) The NSPS Model Standards can be found at the NSPS web site: <http://www.nspis.us.com>

(4) Datums.

(a) All surveys performed must be projected onto the appropriate State plane coordinate grid, NAD 83 datum, unless otherwise specified in the Project Instructions. Put coordinates and distances in the foot unit that is appropriate for the State.

(b) All surveys requiring elevations must be referenced to the NAVD 88 vertical datum unless otherwise specified in the Project Instructions. Express elevations in foot units.

(c) If it is not desirable to orient the survey to NAD83, the survey record must document the transformation between the survey coordinate system and NAD83.

(d) We recommend that new projects be oriented to NAD83 (2011) and published in the OPUS database for inclusion in the proposed NAD22 national readjustment.

I. Monumentation. The boundaries and corners of land define the physical limits of a variety of real property rights and interests. The corner monument is direct evidence of the position of the corner and the location of boundaries. The courts attach major importance to evidence relating to the original position of the corner, such evidence being given far greater weight than the record relating to bearings and lengths of lines. The legal importance of the corner makes mandatory the workmanlike construction of lasting monuments skillfully related to natural objects or ties to improvements so that you secure the greatest practical permanence. If it is necessary to remonument or rehabilitate an existing corner, be very careful to perpetuate the evidence that identified that position. Keep a complete record of the description of the old monument as identified, together with any alterations and additions. The accurate location, marking, posting, and maintenance of Service boundaries identify and preserve the rights of the Service and its adjoiners, while concurrently benefitting most resource activities. The general requirements for monumenting corners and marking boundaries of Service lands are as follows:

(1) Monument corners located on acquired lands in accordance with State minimum survey standards, but not less than the following Service standards:

(a) At all corners, and

(b) Not to exceed ½-mile intervals.

(2) Monuments must be made of iron, aluminum, stainless steel, or other material approved by the RLS (the monument material must be compatible with the soil type):

(a) Posts (pipes) of 2 to 2½ inches in diameter by 28 inches long and set 24 inches in the ground,

(b) Rods 5/8 inch in diameter by 3 feet long, set 30 inches in the ground or point of refusal, or

(c) Rock tablets when the corner point falls on solid rock or an immovable large boulder permanently in place.

(3) Monument caps and rock tablets must be made of aluminum or brass 2 to 3 inches in diameter, and be inscribed "U.S. DEPT. OF THE INTERIOR U.S. FISH AND WILDLIFE SERVICE UNLAWFUL TO DISTURB" around the top perimeter.

(4) Monuments must be stamped with the marks to identify the position of the corner (see Exhibit 11a and 11b for monument cap markings):

(a) Monuments on public land designating a PLSS corner must be marked and set in accordance with the *BLM Manual of Surveying Instructions, 2009*.

(b) The monument cap for a non-PLS corner must have the tract number, corner number, and year.

(c) For State authority surveys, the monument must include the land surveyor's license number.

(d) The monuments must be set with the year oriented to the south.

(5) A witness corner is a monumented point usually on a line of a survey and near a corner. Witness corners must be set only when the true corner position cannot be monumented or occupied, such as in a watercourse. They should be set on the property line or within the purchase tract and not on non-Service lands. The witness corner monument must be marked "WC" at the top of the cap along with the appropriate corner markings as described in (4) above, with an arrow pointing to the true corner position.

(6) Reference monuments are accessories to the true corner position. Two reference monuments must be set when the true corner position can be monumented, but is subject to destruction or inaccessibility (such as a sub-surface monument in a road right-of-way or a corner tree) with no other accessories available. The reference monuments must be set at a point safe from destruction, and within the purchase unit, if possible. The monument cap must be stamped "RM" at the top of the cap along with the appropriate corner markings for the corner that it references as described in (4) above, with an arrow pointing to the true corner position.

(7) All monuments should be surrounded by a mound of stone or earth where practical to do so.

(8) All corners forming the exterior boundary of a part or all of a project area, including the intersections of tangent lines with meanders of topographic or cultural features, must be monumented, where practical.

(9) Where practical, each corner monument must be witnessed by two healthy bearing trees located on land embraced by the survey, or on Federal land. Bearing trees must be tied to the monument by bearing and horizontal distance measurement to the center of the tree at the root crown and should be inscribed with the corner number and tract number or if a PLSS corner in accordance with the *BLM Manual of Surveying Instructions*.

J. Prepare Survey Returns. After completing the field work, the assigned land surveyor must prepare a survey plat for official filing (see Exhibit 12 for a Sample Plat). The survey plat must meet the following criteria, unless otherwise specified in the project or assignment instructions. The survey plat must be adequate to produce a hardcopy official plat plotted using permanent ink on the appropriate size stable base mylar film (see 343 FW 5, Mapping). The plat should include the following:

(1) State, county, and unit name/division;

(2) Tract boundary;

(3) Identified legal lines and adjoining ownership;

(4) Bearing (degrees minutes and seconds) and length (decimal feet) of lines (measured and record);

(5) Curve data (central angle, radius, arc);

- (6) Corner monumentation of all found, set, reset, replaced, or removed monuments, describing their kind, size, and location, and other relevant data (do not use corner identification marked by circles or other identifiable symbols on those lines that were not surveyed on the ground);
- (7) Ties to and description of the accessories (kind and size of bearing trees, reference monuments, etc.);
- (8) Ties to and description of each improvement;
- (9) Ties to monuments of geographic positions, coordinate systems, and bench marks;
- (10) Cultural and physical features;
- (11) Easements located in accordance with the descriptions furnished;
- (12) Encroachments and possession of the title lines;
- (13) Location and name of each road, stream, landmark, etc.;
- (14) Direction of meridian and basis of bearings (a notation should show whether the survey courses are on true north or grid north (south where applicable));
- (15) Graphic scale of map and north arrow;
- (16) Datum, coordinate system, mapping angle, and adjustments;
- (17) History of previous surveys;
- (18) Date of completion;
- (19) Certificates:
 - (a) Federal authority survey certificate (See Exhibit 13 for the FWS Federal authority survey certificate).
 - (b) State authority survey certificate (State-dependent);
- (20) Legend or key to symbols shown;
- (21) Source of data with proper lineage information such as date, scale, projection, and method of data acquisition; and
- (22) Any other features/data that are required by 343 FW 5 and are necessary for the intelligent interpretation of the various items and locations of the points, lines, and areas shown.

K. Survey Review and Plat Signing. After the RLS completes his/her/their review, the responsible land surveyor signs the completed survey. The field notes and associated records used in the course of the survey must be filed in the appropriate survey or tract file. In general, records that relate to real property files are permanent. Survey and map records should be properly protected until put in the National Archives according to the schedule provided in the Disposition Schedules (see 283 FW 2).

L. Filing.

(1) The signed plat:

(a) The original plat is filed in the Service's Regional office.

(b) A courtesy copy of the Service Federal authority survey is sent to the local county or other recording office, and also to any State or local agency maintaining survey records. A duplicate record of the survey must be maintained in a secure and different location from that of the original document(s).

(2) Copies of the plat are put in the tract file and a courtesy copy is sent to the requesting party.

6.3 Access to Private Lands. There is no Federal authority giving Government surveyors the right to enter private land in connection with surveys of land the Service is acquiring or controls. There may be limited access authority under specific State statutes. It is imperative that personnel obtain permission from the landowner(s) or operator, duly constituted officials, or responsible land or resource management agencies before entering on their property to perform work of any kind.

A. The assigned land surveyor should contact the landowner of the subject tract and each abutting landowner when appropriate. We recommend you contact them by phone or personal visit well in advance of beginning the survey. If you are unable to make personal contact, then send a letter by mail with return receipt requested. Also, be certain to document the time and content of the personal contact and any unsuccessful contact attempts. Whether by personal contact or mail, the landowner or other affected party must be informed of the following facts:

(1) Date and time of entry on the land, and period during which entry will occur,

(2) Kind and number of vehicles you will use,

(3) Number of personnel involved, with name and contact information for each person in charge,

(4) Purpose of work, and

(5) Approximate locations on the property where work will take place.

B. The surveyor in charge must notify the landowner or other affected parties, as appropriate, before the survey party initially enters the private property. The surveyor should do this in person, if possible, and must document the visit for the files. If there is damage as a result of the survey, the owner is entitled to make a claim for compensation through established channels.

C. It is possible to get limited protection from a Federal Marshal in the survey of any public lands (43 U.S.C. 774). This includes those lands that have been withdrawn and are under control of the Service. If a survey crew encounters forcible opposition, the Regional Solicitor, working with the U.S. Attorney, should make an Application for Writ of Assistance to the U.S. District Court having jurisdiction in the area. Once the court has entered the Writ, then the survey crew can coordinate assistance directly with the U.S. Marshal Service district office.

Chapter 7

Boundary Posting

7.1 Boundary Posting. It is Service policy to post all exterior Service boundaries on fee and withdrawn lands at the time of acquisition and to maintain the posting on these boundaries as long as the Service manages the lands. Highly visible property boundaries protect both Service and non-Service lands by putting everyone on notice as to the boundary location, reducing trespass and unauthorized uses. Ultimately, this protects wildlife habitat and minimizes administrative and legal procedures often necessary when boundaries are not posted or are improperly identified.

A. Posting a boundary involves establishing inter-visible posts with signs along the exterior boundaries of Service lands, and clearing vegetation to provide a line of sight. In some cases, clearing a direct line of sight may not be required where a cleared corridor already exists nearby, such as road or powerline right-of-way.

B. Inter-visible posting on exterior boundaries allows Service employees and visitors to avoid accidentally encroaching on neighboring land, and makes trespass or encroachment onto Service lands easier to detect.

C. Project Leaders and field station managers are responsible for ensuring all exterior boundaries of Service lands are posted according to Service standards unless there is an active land acquisition in progress. Once the acquisition is final, boundary posting is required on the new external boundary.

D. Field station managers can determine what type of boundary sign to use by referencing the [Service Sign Manual](#).

E. The RLS can assist field station managers with posting boundaries by:

- (1) Directing in-house personnel in posting the boundary,
- (2) Contracting to post the boundaries,
- (3) Training and overseeing field station employees to post the boundaries,
- (4) Marking the boundary sufficiently for the field station manager to post, and
- (5) Acquainting the field station manager with the location of the boundary monuments and property lines.

F. When working on an installation, the RLS or a member of his/her/their staff should make a physical inspection of nearby boundary conditions. The surveyor should inspect the perimeter boundary line and note such items as missing corners, guard posts rotted or destroyed, improper posting, and possible encroachments. The surveyor should then submit a written report to the field station manager about his/her/their findings and recommendations for corrective actions. It is the responsibility of each field station manager to protect and maintain the boundary monuments and sign posts of their station.

G. Place boundary posts and signs on all exterior boundaries of Service lands (see Exhibit 14 for a diagram on placing boundary posts).

- (1) The boundary of Service property or an easement is marked:

(a) Within 1 foot of the legal boundary (see [Service Sign Manual](#) for determining what type of boundary signs to use),

(b) Inter-visible and not to exceed intervals of 1 tenth of a mile in distance,

(c) At each monument, 3 to 10 feet from the monument,

(d) 50 to 200 feet from boundary corners greater than 22.5 degrees, and

(e) At all roads, trails, ridges, and water crossings.

(2) Where the boundary line passes through a tree, that tree should be blazed at Diameter Breast Height (DBH) at approximately the position the line passes through the tree. A boundary sign will be nailed to the tree with aluminum nails, not fully driven into the tree so as to leave room for tree growth.

H. Permanent structures that mark a boundary, such as a fence or wall, must be constructed within ½ foot of the legal boundary line, and preferably on the boundary. Do not “back off the line” (offsetting from a theoretical position of the boundary line).

Chapter 8

Construction and Maintenance Surveys

8.1 Construction and Maintenance Projects. Every year the Service carries out millions of dollars of construction and maintenance projects, ranging from fence building to tidal restoration. In accordance with 343 FW 1.6, the RLS is responsible for supporting the field stations and the Division of Engineering to ensure that:

A. The Service constructs buildings and structures on lands that we own so they do not interfere with existing rights, such as easements. This means that the RLS will assist the Project Manager in:

- (1) Researching the boundaries and land ownership,
- (2) Identifying any additional rights-of-way or easements that may be required for project completion, and
- (3) Carrying out any required cadastral surveys and posting.

B. The Service performs surveys for construction projects efficiently and in a way that supports Service land management and land acquisition programs. This means that:

- (1) Topographic and control surveys or other mapping required for project design and construction are conducted according to professional standards either by the RLS, or according to contract technical standards established by the RLS, and
- (2) Topographic or control surveys take advantage of work previously done; support the needs of the Realty, land management, or other Service programs; and are referenced to the correct coordinate systems.

8.2 Roles and Responsibilities.

A. Project Manager. Every construction or maintenance project is under the direction of a Project Manager (PM). Who the PM is depends on whether the project is considered “exempt” or “non-exempt,” as described in 360 FW 1. In consultation with Regional program staff, the Regional Engineer determines which construction projects are exempt and which are non-exempt.

(1) Projects with life-safety, environmental, accessibility, fire protection, building code, seismic safety, structural, or demolition issues are non-exempt. We call them “non-exempt” because we require that the Regional Engineer or the Chief, Division of Engineering (DEN), reviews, approves, and signs the final designs before we procure construction materials or services. These projects include buildings, dams, roads, bridges, elevated boardwalks, and other structures that require handrails or other safety devices. Non-exempt projects are typically managed by the Regional Engineering office. The PM is typically an engineer, architect, or landscape architect. The PM is responsible for leading, coordinating, and facilitating the project team on all project design (including surveys), schedule, budget tracking, and construction issues.

(2) Projects without life-safety, environmental, accessibility, fire protection, building code, seismic safety, structural, or demolition issues are exempt. These projects, which can include fences, road resurfacing, construction of kiosks (without overhead structure), and on-grade trails, can be managed by the field station Project Leader. Although in cases where plans and specifications or special expertise are required, a construction PM may be designated. In that case, the Project Leader ensures that the exempt construction project follows the approved design.

(3) For both exempt and non-exempt projects, Project Leaders are responsible for environmental permits and clearances and cultural resources consultations, and have historically been responsible for ensuring that the boundaries and land ownership issues are covered.

B. The Regional Land Surveyor.

(1) As we describe in 343 FW 1, cadastral surveying is the responsibility of the RLS, and all construction, maintenance, and land management activities must take place inside surveyed and posted boundaries. All PMs must coordinate with the RLS when developing project plans.

(2) The RLS does not have the same level of responsibility with regard to the topographic, control, and mapping surveys that may be required for project design. While the RLS may carry out or contract for these kinds of surveys, Regional land survey programs typically do not have the necessary staff. Instead, as described in 360 FW 1, the construction PM is responsible for the overall project, and the RLS is responsible for establishing survey technical standards. The RLS needs to leverage his/her/their technical expertise to support the Federal employees or contractors who are actually doing the work.

(a) *Federal employees:* Federal employees (working within the scope of their position) are exempt from professional licensure requirements and are subject only to the controls of the policies of their Department or Agency. Because of this, Service land surveyors and civil engineers who are not licensed in the project State may perform topographic or other pre-design surveys as long as they use the RLS-provided technical standards. As with cadastral surveyors, we encourage but do not require State licensure for Service employees carrying out pre-design surveys. To the extent possible, the RLS should provide training and oversee these employees.

(b) *Contractors:* Topographic surveys and controlled mapping for project design falls under the requirements of the Brooks Act and the Architecture and Engineering provisions of the Federal Acquisition Regulation (see Chapter 10). At the discretion of the PM, the design survey may either be contracted through the RLS or a through a qualified land survey subcontractor to the engineering firm working on the project. In either case, the survey work must be performed in accordance with RLS-provided technical standards.

8.3 Funding and Management of Construction and Maintenance Projects. The Regional Engineering divisions within the Service are responsible for many diverse programs, such as seismic, dam, and bridge safety, environmental compliance, and building energy efficiency, but their primary duty in the Service is to manage construction and maintenance projects. This is where land surveyors and engineers interact most often. All surveys required for construction and maintenance projects will typically be paid for by construction project funds.

A. Deferred Maintenance Projects.

(1) Refuges and Fisheries both receive annual appropriations for facility maintenance. In the Refuges program, these funds are coded to sub-activity Refuge Maintenance (1262) within the Resource Management appropriation. Most of the maintenance appropriation funds are for ongoing annual maintenance, but a portion is allocated to “Deferred Maintenance (DM),” that is, costs of repairing, replacing, or removing assets that have not or cannot be covered by the annual maintenance program. Examples of DM projects that require land survey services include replacement of boundary fences and construction of new buildings to replace obsolete ones. Projects that involve DM to roads, bridges, and parking lots may also be funded through the transportation program (sub-activity 8551 or 8555).

(2) The DM projects are based on the condition, repair cost, and replacement cost, as documented in the Maximo database. The 5-Year Deferred Maintenance Plan is a prioritized list of projects scheduled for DM funding, based on projected appropriations. However, the projects funded in any particular year

depend on the amount of funding Congress appropriates and the Service allocates to the Region, and on the relative importance of the various projects as determined by the program management teams.

B. Construction Projects. Construction appropriation funding is less predictable than that for DM. As described in 360 FW 1, the Investment Review Board maintains a 5-year construction plan that schedules funding for the Service's highest priority construction appropriation projects. These projects may include new (non-replacement) facilities, such as visitor centers or water management facilities, as well as repairs and replacements too expensive to fund with DM money. The actual funding of these projects is subject to specific Congressional appropriations. New construction and major repairs may also receive construction appropriation funding outside the 5-Year Plan, e.g., through emergency supplementals and Congressional earmarks.

C. Advance Project Planning.

(1) It is very important to include costs for any needed surveys in the estimates of DM and construction projects. For projects that will require them, approximately 17% can be added to the project cost estimate for all engineering and surveying. This may be adequate to cover topographic surveys, but may not be enough for cadastral surveys, particularly for boundary posting or fencing projects where the cost of replacing the assets themselves is relatively low. The Regional Asset or Facilities Manager who develops the project lists may be unaware of the need for a cadastral survey on a particular project and what it may cost. By identifying these costs early in the project planning cycle, the RLS and the Facilities or Asset Manager can avoid insufficient funding when the project is actually funded.

(2) As described in 343 FW 3, when a project is first added to the 5-year DM or Construction plan, the Regional Asset Management Coordinator should contact the RLS to scope the survey needs and cost. Since 5-Year Plan projects may remain unfunded for 5 years, or may be bumped from the plan by higher priority projects or reduced appropriations, the RLS spends a limited amount of time on developing these cost estimates. The RLS should indicate whether a cadastral survey is required, give some idea of any unusual mapping needs (such as hydrographic or aerial surveys), and give a rough estimate of the cost. In cases where the cadastral survey costs are unusually high, the RLS may want to contact the Project Leader or program management to explore additional funding.

D. Current Project Scoping.

(1) Project scoping begins when the project list for the next fiscal year is being developed. DM project lists are subject to change in their early stages as managers juggle priorities and available funds, but the Regional Asset Management Coordinator should provide the RLS with a copy of the proposed projects when the list has somewhat stabilized. At this point, the RLS identifies the projects on the list that take place outside of the footprint of an existing building, and contacts the PMs.

(2) Project scoping items:

(a) *Land ownership, encumbrances, and right-of-way needs.* It is fundamental that assets need to be built on land owned by the Service, and they must be built in a way that does not violate the rights of others. While it is technically the responsibility of the field station to ensure that this is the case, it is quite possible that a Service-owned tract is subject to easements, restrictions, or boundary conflicts that the Project Leader is not aware of. The land ownership records and the expertise to interpret them are found in the Realty Division, so it falls to them to provide the Project Leader with technical assistance. If easements or rights-of-way need to be acquired for a project, that function also falls to the Realty Division. There is no specified process for carrying out this review.

(b) Cadastral survey needs and costs. The RLS will review all projects for cadastral survey needs and will check the assumptions and costs. A realistic budget, schedule, and method of survey (in-house, agreement, or contract) must be determined.

(c) Topographic or other pre-design survey needs and costs. The RLS will consult with the PM on the best way to provide these services and on their likely cost. If a project requires both a cadastral and topographic survey, we recommend that both surveys be carried out under the direction of the RLS. While a cadastral survey associated with a maintenance project may be carried out by a qualified Architectural and Engineering firm or subcontractor (using specifications the RLS provides and with the RLS acting as the COR), we do not recommend it. The divided lines of authority that this creates are inefficient.

8.4 Specifications for Control and Topographic Surveys.

A. The objectives of the pre-design survey are to:

(1) Create a map of the proposed project that is accurate and detailed enough to support the required permitting and design,

(2) When required, correctly relate the project to recognized datums for design and documentation, and

(3) Leave behind accurate and stable control points that will support both construction and future Service activities.

B. The specific survey requirements will be different for each project. A set of general specifications is attached as Exhibit 15.

C. Specifications for control points and control surveys are in Chapter 6, "Cadastral Surveys."

D. For control and topographic surveys that contractors perform and that are not under the direct oversight of the RLS, the PM provides copies of all survey field notes, maps, and digital files to the RLS for archiving.

8.5 Construction Projects on Non-Service Lands. The Service provides technical and financial assistance to improve fish and wildlife habitats for Federal trust species on lands that the Service doesn't own. This is primarily done through 1) the Partners for Fish and Wildlife Program and the related Coastal Program, both administered by the National Wildlife Refuge System, and 2) the National Fish Passage Program, which is administered by Fisheries. Following is a brief orientation to these programs for Service land surveyors:

A. Partners for Fish and Wildlife.

(1) Some Partners projects, such as stream, wetland, and tidal restoration require surveyed base maps for design and construction control. Projects are surveyed by Service or other Federal employees, licensed professional contractors, or partners with varying levels of training and experience.

(2) Partners projects are managed by biologists stationed at Fish and Wildlife Offices, Fisheries Resources Offices, and Refuge Complex Offices. Although most Partners projects are structured as cooperative agreements with non-Federal landowners or partner organizations, some are located on U.S. Department of Agriculture conservation easements or other Federal interest lands, and are structured as Inter-Agency Agreements. Some Partners projects are actually located on Farm Service Agency lands

that have been transferred, as easement or fee title, to the National Wildlife Refuge System. Refer to 640 FW 1 for policy on the Partners program.

B. The National Fish Passage Program. The National Fish Passage Program (NFPP) provides funding and technical assistance to reconnect aquatic habitat and fish by removing or bypassing barriers. Projects typically involve culvert replacement or dam removal, requiring surveyed control and base maps for design. As with the Partners program, Service or other Federal employees, professional consultants, or partners perform the surveys. The policy governing the NFPP is in 710 FW 1.

C. Roles and Responsibilities.

(1) There is no formal oversight of the Partners or NFPP programs by either the RLS or the Regional Engineer. Depending on availability and funding, the RLS may be able to provide the consultation and survey services described previously in connection with Service construction projects.

(2) Whether working on Federal or private land, per 343 FW 1, all Service employees using survey-grade instruments must be working under survey technical standards supplied by the RLS. The RLS and the programs should coordinate equipment acquisition and information sharing in areas where Service and other Federal projects can benefit.

(3) All direct contracting of surveying and mapping for habitat improvement projects, whether on Federal or non-Federal land, must be in accordance with the Federal Acquisition Regulation Part 36 (Construction and Architect - Engineer Contracts) AND use survey technical standards supplied by the RLS.

(4) For projects on private land where the cost of surveying or mapping is being contributed by a partner or landowner, the Partners or NFPP PM should ensure that State law regarding professional licensure is being followed. If State law includes topographic surveying in the definition of "land surveying," all surveying must be carried out under the supervision of a licensed land surveyor (or engineer, as appropriate).

(5) For Partners projects on private land, PMs should ensure that the project has been designed with due regard for the location of boundaries and any outstanding easements or restrictions. It is important that the project does not interfere with property rights of others.

8.6 The Refuge Roads Program. The Refuge roads program is a joint effort by the Service and the Federal Highway Administration (FHWA) to maintain and improve Refuge roads, which are defined as public roads that provide access to or within a unit of the National Wildlife Refuge System, and which are owned and maintained by the Federal Government. In addition, there are many specially-funded transportation projects that are carried out by the FHWA for the NWRS.

The FHWA Federal Lands Highway Program is focused on the construction and maintenance of highways. FHWA employees or contractors conduct all surveying and design work for the Refuge roads projects. Generally, oversight by the RLS is not required. However, the RLS should coordinate closely with the Regional Refuge Roads Coordinator to ensure that FHWA PMs have access to all of the control, boundary, and right-of-way data that the Service has, and that the control and topographic surveying that is done for the projects is shared with the Service and can be used for other purposes.

Chapter 9

Surveys for Water Resources, Mapping, and Science

9.1 Overview. To carry out their mission, a number of Service resource management programs require data based on survey-grade measurements or controlled mapping. This chapter covers the use of survey instruments by Service employees who are not professional land surveyors, and acquisition of survey-grade data and mapping not related to construction or maintenance projects.

A. Definitions.

(1) Survey-grade describes an instrument or technology capable of producing an accuracy of 1 foot or less, or a map or data set produced by that technology. Examples include carrier-phase GPS, total stations, differential leveling, stereo compiled photography, LiDAR, and sonar.

(2) Controlled mapping is a survey-grade map or data set produced by a professional contractor using primarily aerial or remote sensing technologies that is referenced to a known horizontal and vertical datum via a control survey, and that meets defined accuracy requirements.

B. Roles and responsibilities.

(1) Per 343 FW 1.6, the Regional Land Surveyor (RLS) is responsible for establishing survey technical standards (or carrying out surveys) for the control and evaluation of aerial mapping and remote sensing, the acquisition of water rights, and establishing standards for the use of survey-grade instruments by non-surveyors.

(2) As the Service's experts in precise measurement systems, the role of Service land surveyors is to leverage their knowledge and experience in support of all Service programs. This includes:

- (a)** Consultation with other programs on appropriate techniques to achieve the program objectives,
- (b)** Coordination of instrument purchasing and sharing,
- (c)** Training and technical support, and
- (d)** Management and sharing of survey control data for the benefit of multiple programs.

(3) It is the responsibility of programs using survey-grade measurements to coordinate with the RLS on the general aspects of their programs and follow technical standards provided by the RLS.

(4) The land surveyor must always act within his/her/their field of expertise. While Service land surveyors are experts in cadastral and control surveys, and usually have expertise in topographic surveys for engineering design, there are specialized surveys where they may require additional training (e.g., precise leveling to NGS standards) or where the scientific needs are best identified by the resource specialists (e.g., surveys that involve plant identification or stream morphology).

9.2 Water Resources and Water Rights Surveying.

A. The Water Resources Program. Responsibility for water management is primarily with the Refuges, Hatcheries, and other field stations, but they are supported by water resources specialists in each Region. These specialists, typically hydrologists, provide the necessary expertise in water measurement and modeling. The Regional Water Rights Manager is responsible for identifying and evaluating water rights proposed for acquisition and managing the Service's water rights within that Region (see 403 FW 1).

B. Water Rights. Surface water and groundwater are under State jurisdiction, and the right to divert and use that water is based on State laws. In the eastern United States, where there is rainfall during the growing season, State water rights generally follow the “riparian” system, where the owner of land bordering a water body has the right to divert and use the water. In the western United States, where rainfall may be sparse during the growing season, water rights law generally follows the “appropriative” system, where the right to divert and use water is based on seniority and continued use.

C. Acquiring and Managing State Appropriative Water Rights. The subject of water rights is complicated, and the rules and processes vary from State to State. The following simplified discussion is based on current Oregon practice, and is presented only to have a framework to discuss possible roles for land surveyors in the process. Water rights applications and certificates are generally classified based on whether the water being diverted is groundwater (from wells) or surface water (from rivers and streams), and whether the water is being stored (in reservoirs or wetland impoundments). States may permit the Service to transfer existing water rights to in-stream flow. Following is an example of the water rights acquisition process for construction of a Refuge wetland impoundment (considered a “reservoir”):

(1) Application. The Refuge applies for the right to construct a reservoir based on estimated storage volume and levee height. The application specifies the proposed use (irrigation or wildlife habitat), point of diversion (where the water leaves its natural flow), place of use (where the water will be used), and proposed timing of the use.

(2) Permit. The State issues a permit to construct the reservoir to certain specifications within a given time period, and to fill it with (divert) a given volume of water, during a specified period of the year, possibly subject to certain restrictions, such as fish screening or fish passage.

(3) Claim of Beneficial Use. When construction is complete, the reservoir is filled and used for 1 year in accordance with the permit conditions. The claim of beneficial use (or similar) is a document filed with the State certifying that the construction is complete and identifying the volume of water that is actually being used in compliance with the terms of the permit.

(4) Certification. The State issues a Water Rights Certificate bearing a priority date (usually the date of the application) that establishes the seniority of the new water right. If demand outstrips supply in that watershed, junior water users may be denied access to water based on the priority date of their certificates.

(5) Maintenance. After the Certificate is received, there are many tasks that need to be carried out to manage and protect the Service’s water rights. Depending on State law, we may run the risk of losing the water right if we don’t use it on a regular basis, so use is documented by the field station. There may be annual water use reporting requirements established as part of the Certificate. As the Refuge’s needs change, the capacity of the reservoir, or the location and nature of the use may change; these changes may be made via a transfer process, requiring submission of a transfer application similar to the process of the original acquisition.

D. The Land Surveyor’s Role in Water Resources and Water Rights.

(1) Technical Standards and Support. The Regional water resources specialists are generally very knowledgeable in the techniques of differential leveling, especially related to establishing water monitoring sites (staff gages, data loggers, etc.). The U.S. Geological Survey has established national standards for this process, so having the RLS set technical standards would be redundant. Depending on the level of expertise available in the Region, the RLS can play a useful role in:

- (a)** Identifying methods and equipment for connecting water monitoring sites to an appropriate vertical datum;

(b) Acquiring and sharing instruments such as RTK GPS and total stations and software for topographic modeling, and providing training and technical support on their use; and

(c) Coordinating data collection and management to get the maximum benefit for the Service. For example, benchmarks established for water monitoring efforts may be useful for Realty or Engineering projects and vice versa.

(2) Water Rights Acquisition.

(a) Some states, such as Oregon, Nevada, and Washington, have established mandatory licensure for individuals who prepare water rights documents, such as claims of beneficial use and transfer applications. This requirement may be a special endorsement to an existing professional land surveyor or engineer license. In these cases, a Service land surveyor should obtain the required water rights licensure.

(b) Claims of beneficial use and transfer applications can require water storage volume calculations derived from field measurements, cross sections through any impoundment structure, and location of the point of diversion and place of use relative to the Public Land Survey System (PLSS) via a tie to an existing corner monument. Monument ties and PLSS mapping must be performed under the direct oversight of the RLS if performed by employees, and by a licensed professional land surveyor if performed under contract. Contracts for professional land survey services must be obtained via the Architecture and Engineering process (see Chapter 10).

(c) It is the responsibility of the Regional Water Rights Manager to request and fund water rights services, including surveys. At the discretion of the Regional Water Rights Manager, and depending on specific State requirements, the RLS may carry out water rights surveys, aid in developing and managing contracts for water rights surveys, or provide technical standards and support for water rights surveys.

9.3 Controlled Mapping. As we explain in section 9.1B.2. above, “controlled mapping” is a survey-grade map or data set produced by a professional services contractor using primarily aerial or remote sensing technologies that are referenced to a known horizontal and vertical datum via a control survey, and that meet defined accuracy requirements. This chapter applies to acquisition of controlled mapping services, not acquisition of standard image or remote sensing products.

A. A controlled mapping project typically includes the following survey functions:

(1) Control Surveys. All controlled mapping is referenced to a framework that is realized on the ground by a series of physically monumented points. These points may be previously existing points or newly set for the project. They may already have reliable positions based on previous survey work, or they may require a new control survey as part of the project. The points should be as stable as possible so that future changes may be detected by mapping that is referenced to the same points. Per 343 FW 1, the RLS carries out or contracts for the control network.

(2) Quality Control/Quality Assurance (QA/QC) surveys. Controlled mapping contracts typically specify horizontal and vertical accuracy for the features to be mapped. The RLS, another contractor, or some other third party measures a series of check points from the same set of control points that the mapping contractor used to determine if the contract deliverables meet specifications. The entity performing the QA/QC surveys may also assess other aspects of the project deliverables.

(3) Supplemental Topographic Surveys. It is usually the case that some important features of interest cannot be mapped directly by the mapping technology used. This includes topography of areas obscured by heavy vegetation and features such as culverts that are underwater or otherwise not visible to the camera or sensor. It may be necessary in such a case to conduct a supplemental topographic or bathymetric survey. The RLS, a licensed contractor, or Service employees must perform the survey.

B. The process for obtaining mapping for design of a construction or maintenance project is described in 343 FW 4 and Chapter 10 of this handbook.

C. Contracting for controlled mapping.

(1) Mapping that is "... associated with research, planning, development, design, construction, alteration, or repair of real property" and "... as defined by State law [is] required to be performed or approved by a person licensed, registered, or certified to provide such services" (40 U.S.C. 471 et seq. – Brooks Act) is considered to be an Architecture and Engineering (A&E) service and must be acquired using the qualification-based selection process defined there and in the Federal Acquisition Regulation, Part 36.

(2) Most controlled mapping is suitable for research, planning, or design of improvements such as stream or wetland restoration or drainage improvements. Selecting mapping contractors by A&E procedures is a good way to ensure that the provisions of the law are carried out. See Chapter 10 for a detailed explanation of A&E contracts.

9.4 Surveying for Scientific Investigations.

A. Survey-grade measurements are required for a wide variety of scientific investigations. Examples include:

(1) Topographic surveys of stream gravels for fish habitat assessment,

(2) Location of newly-forming tidal channels in a restoration project, and

(3) Establishment of surface elevation tables for monitoring sea level rise or sedimentation rates.

B. When making precise measurements as part of scientific investigations, it is important that the instruments be used properly, and that the data be related properly to a stable reference frame so that observed differences of data over time reflect real changes in the environment and not differences in datum or measurement techniques.

C. It's important that the researchers and the Service land survey program staff coordinate to ensure that the funding and effort invested in surveys benefit as many Service functions as possible.

D. Best practices for use of survey-grade technologies in scientific investigation are documented in U.S. Fish and Wildlife Service. 2012. Data Delivery Standards and Specifications Template. USFWS, Pacific Southwest Region. Sacramento, California.

Chapter 10

Contracts and Agreements

10.1 Overview. A 'contract' is how we obtain land survey services from any non-Federal entity. A contractor can be a private firm, a State agency, or a non-profit corporation. An 'agreement' (specifically an Intra- or Inter-agency Agreement - IAA) is how we obtain land survey services from other bureaus or Federal agencies. Land survey services are sometimes provided by non-Service partners as part of cooperative agreements or through other financial assistance programs; these programs are not covered in this handbook.

Contracts and agreements are an important resource that can expand the capability of our staff to provide survey services to our customers. It is up to each Region to establish the mix of contracts, agreements, and in-house work that best meets their needs. Even in a Region where land surveys are primarily carried out by in-house staff, contracts and agreements are still an important tool for leveraging funding opportunities and providing better service to the resource management programs.

The material in this chapter is intended as a general guide and training tool for Service land surveyors and their customers. Policies and processes may vary somewhat among Regions, and the laws, regulations, and policies governing Federal acquisition are always subject to change. Be sure to consult the links provided, and follow the guidance of Contracting Officers (CO).

A. Terms and Abbreviations. We use the following abbreviations frequently in this chapter.

CGS	Division of Contracting and General Services
CO	Contracting Officer
COR	Contracting Officer's Representative
FAR	Federal Acquisition Regulation
FBMS	Financial and Business Management System
IAA	Inter-agency Agreement (outside DOI)
	Intra-agency Agreement (inside DOI)
IDIQ	Indefinite Delivery/Indefinite Quantity
IGE	Independent Government Cost Estimate
MO	Miscellaneous Obligation
PR	Purchase Request
SOW	Statement of Work
TO	Task Order

B. Survey projects that are best suited for contracts or agreements are:

- (1) Projects that are beyond the in-house capacity of the Regional Land Surveyor (RLS),
- (2) Projects that are not of a routine nature,
- (3) Projects that require special skills or equipment, such as hydrographic and aerial surveys, and
- (4) Cooperative surveys with partners outside of the Federal Government, or other Federal agencies.

C. Survey projects that are less suited for contracts or agreements are:

- (1) Small projects where contract administrative costs are disproportionately high,
- (2) Projects of a complex or indeterminate nature where a scope of work cannot be clearly determined or where there are problems with access to the project area,
- (3) Projects where contract funding is not available, and
- (4) Projects where litigation is likely.

D. Survey projects that are best suited for agreements with the Bureau of Land Management (BLM) are:

- (1) Projects that legally require an official BLM cadastral survey, such as an original survey or a land disposal requiring a U.S. patent,
- (2) Projects that involve tribal trust or other Indian lands,
- (3) Projects that involve retracement of the Public Land Survey System and:
 - (a) Are of a complex or indeterminate nature where a scope of work cannot be clearly determined,
 - (b) Require special expertise, or
 - (c) Are likely to result in litigation.

E. Federal Acquisition Regulation (FAR) vs. FAR-Exempt contracts.

(1) Practically all of the goods and services acquired by the Federal Government are obtained under the FAR. Under the FAR, only a CO who has been trained and certified may order goods or services because they are the only people who are authorized to legally bind the Government in a contract or Inter-Agency Agreement. The role of technical specialists such as land surveyors in a FAR contract is to assist the CO in describing what we want, defining evaluation criteria for selecting the contractor, acting as the CO's Representative (COR) on the contract, and confirming that we have received what we have paid for. The vast majority of Service land survey contracts will be governed by the FAR, and all further discussion of contracting in this chapter refers to FAR procedures.

(2) However, since the purchase of land is specifically exempt from the FAR, the Department's Solicitor has issued an opinion (M-36974, 7/30/1992) that contracting for surveys directly tied to land acquisition projects is exempt from the FAR. In a FAR-exempt survey contract, the Regional Realty Officer, as the line officer with budgetary authority, takes on the role and responsibility of the CO.

(a) Per 343 FW 4, use of FAR-exempt contracting of surveys for land acquisition projects is not mandatory. Generally, it should only be used for small, low-risk projects, or when use of FAR survey contracts is not practical.

(b) FAR-exempt contracts are subject to the requirements of the Brooks Act, and the qualifications-based selection procedures outlined in section 10.4 below must be followed. We recommend that you use contractors who have already been selected by Brooks Act procedures for FAR-exempt contracts.

(c) You initiate a FAR-exempt contract using an approved Acquisition Request and obligate it via an MO within FBMS.

10.2 Roles and Responsibilities in Contracting.

A. The RLS's responsibilities in contracting include:

(1) Coordinating with the Regional Realty Officer, Project Leader, and other customers to identify survey needs, and determine if the Service should contract for a land survey;

(2) Preparing documents for the solicitation and cost estimates;

(3) Assisting the CO by:

(a) Leading an evaluation panel to rank potential contractors by qualifications;

(b) Evaluating contractor fee proposals to identify a reasonable fee for the services; and

(c) Serving as the COR to administer the contract, providing Government-furnished materials, evaluating contractor performance, and approving payments.

(4) Attaining or maintaining a COR certification (see 302 FW 2).

B. The Regional Realty Officer or Project Leader is responsible for:

(1) Providing project needs, schedule, and budget to the RLS, and reviewing statements of work for issues of site access, timing, and resource protection;

(2) Approving purchase requests; and

(3) Providing Government-furnished material (such as posts and signs) to the COR or the contractor when appropriate.

C. The CO is responsible for:

(1) Identifying the type of contract and type of competition to use,

(2) Selecting the contractor,

(3) Awarding the contract or task order,

(4) Issuing the Notice to Proceed,

(5) Issuing contract modifications and stop work orders,

(6) Designating CORs and inspectors, and

(7) Maintaining functional control of all phases of the contract.

Regardless of any statements to the contrary in this handbook or elsewhere, the survey contracting process is directed by our Contracting and General Services program and the CO. Refer to the Service *Contracting Officer's Handbook* for a complete and up-to-date list of CO responsibilities:
<https://sites.google.com/a/fws/gov/co-handbook>

10.3 The Contract Process. The processes for developing and administering a stand-alone fixed price contract (see section 10.6.A(1)), an Indefinite Delivery/Indefinite Quantity (ID/IQ) contract (section 10.6.A(2)), and a TO on an IDIQ contract are slightly different and may not contain each of the elements we describe below.

A. Preliminary Planning.

(1) Regardless of how the need for a survey project is identified, the decision to approve the allocation of funds to a contract is made by a line officer, who is the customer for the contract. Customers can include:

(a) Assistant Regional Directors,

(b) Division Chiefs, and

(c) Field Station Project Leaders.

(2) The project formally begins when the RLS receives a Land Survey Services Request from a customer or their designee. The RLS reviews the available data and discusses the project with the customer. If a survey is required, the RLS develops a preliminary project description and cost estimate and obtains informal approval of the project scope, budget, and timeline from the customer.

B. Prepare a Statement of Work. After receiving informal project approval from the customer, the RLS prepares a Statement of Work (SOW). The SOW is the part of the contract that describes in detail the work required and the conditions in the project area. (Note: the project instructions contain much of the required information and should be referenced in the SOW and not repeated.) The SOW is covered in detail in section 10.6.B(2 and 3). If the project is not a TO on an IDIQ contract, a set of technical specifications will also be required (10.6.B(1)).

C. Prepare a Cost Estimate. Based on the SOW, the RLS develops an Independent Government Estimate (IGE) of the cost of the project. An accurate cost estimate is critical to helping the CO determine whether the contractor is proposing a reasonable fee for the project. The estimate is kept strictly confidential; it is never released to anyone who is not a Government employee, and then only to a Government employee who needs to know as a part of his/her/their official duties. Development of cost estimates is covered in section 10.7.A.

D. Submit a Purchase Request. After reviewing the SOW and cost estimate with the customer, the RLS prepares and submits a PR through FBMS. The PR contains the name and description of the project, the estimated cost, the fund code to which the cost will be charged, and the time when the contract should start and stop. The SOW, IGE, and technical specifications (if required) are attached to the proposal.

Approval of the PR by the customer and certification of the availability of the funds constitutes the approval for CGS to take action on the request. A CO is assigned to the project and the process of selecting the contractor, negotiating the fee, and awarding the contract begins.

E. Contractor Selection. Land Survey services are acquired under the Architect-Engineer Services Part 36 of 48 CFR, which requires that the Government "... negotiate contracts ... based on the demonstrated competence and qualifications of prospective contractors to perform the services at fair and reasonable prices." In other words, rather than soliciting bids, the prospective contractors are evaluated to determine which are the most qualified for the project, and then the CO attempts to negotiate a contract with the most qualified firm.

We evaluate prospective contractors on the basis of information provided on Standard Form 330 "Architect-Engineer Qualifications." The RLS typically serves as the chair of a selection panel that examines the SF-330's and ranks the firms by qualifications. The ranking, along with a written evaluation, is given to the CO, who approves it and selects the most qualified firm to begin negotiations. The process of evaluating and selecting contractors is covered in detail in section 10.5.

F. Fee Negotiation. The CO provides the SOW and any other informational material to the contractor, with a request for a fee proposal. The CO may ask the RLS to answer any technical questions that the contractor may have about the SOW, and, when the proposal is received, the CO may request that the RLS evaluate it. Depending on how it compares with the IGE, the contractor's proposal may be accepted, or there may be a series of discussions between the contractor, the CO, and the RLS to identify the reason for the differences. When an acceptable proposal is obtained, the CO awards the contract, and designates a land surveyor as the COR (they must be certified) at the recommendation of the RLS. Fee negotiation is covered in detail in section 10.7.

G. Contract Administration. As the COR, the land surveyor has many duties, including providing Government-furnished information and property, ensuring good communication with the field station or customer, tracking the contractor's progress, reviewing deliverables, and approving payments. The COR does not direct the work of the contractor, and is not authorized to order the contractor to start or stop work. If questions or disputes arise, the COR advises the CO on the technical issues in question. Contract administration is covered in detail in section 10.7.

10.4 Contractor Selection.

A. Evaluation Criteria. Land survey services are acquired under FAR 36.601-1, "Selection criteria," which requires that the Government "... negotiate contracts for these services based on the demonstrated competence and qualifications of prospective contractors to perform the services at fair and reasonable prices" as mandated by 40 U.S.C. 1101, et seq., commonly referred to as the Brooks Act. *Note that under the Brooks Act, qualification-based selection of land survey contractors is required for all land surveying services, whether acquired under FAR or FAR-exempt contracts.* FAR 36.602-1 lays out six criteria for evaluating contractor qualifications:

- (1) Professional qualifications necessary for satisfactory performance of required services;
- (2) Specialized experience and technical competence in the type of work required, including, where appropriate, experience in energy conservation, pollution prevention, waste reduction, and the use of recovered materials;
- (3) Capacity to accomplish the work in the required time;
- (4) Past performance on contracts with Government agencies and private industry in terms of cost control, quality of work, and compliance with performance schedules;
- (5) Location in the general geographical area of the project and knowledge of the locality of the project, provided that application of this criterion leaves an appropriate number of qualified firms, given the nature and size of the project; and
- (6) Acceptability under other appropriate evaluation criteria.

B. The Statement of Qualifications. The basis for the evaluation of survey contractors is the Standard Form 330 Architect-Engineer Qualifications. On this form, prospective contractors are required to list the education and professional qualifications of key employees, the experience that these employees have on similar projects, the size and capacity of the firm to perform the work, and any specialized equipment or experience that the firm has that relates to the anticipated needs of the Service. Although the SF-330 can be downloaded and filled in as printed, it may also be reformatted and supplemented with additional information, including photographs, work samples, reference letters, etc. Database software is available that will store the contractor's information, including resumes of key personnel and past project information. It can also produce SF-330s that are customized to the agency and project. In order to ensure that all prospective contractors have their qualifications fully and accurately documented, it is a good idea to make sure that first-time contractors are aware of the options available to them, and the need to fill out the SF-330 as completely as possible.

C. The Solicitation. When the need for a survey contract has been identified, and a Purchase Request has been approved and certified, the CO will identify the process we will use to select one or more qualified contractors. For complete and up-to-date information refer to the Service *Contracting Officer's Handbook*.

(1) Full and Open Competition: If the expected total cost of the project is over the “simplified acquisition threshold” (\$150,000 in 2013), a solicitation will be published for the mandatory period listing the type of work that is required, and inviting qualified firms to submit SF-330s to the contracting office. The RLS may submit the names and contact information of qualified firms, who will also be informed of the solicitation. There is typically no limit on the size of a firm that we may select for this type of contract.

(2) Short Selection: If the expected total cost of the project is under the “simplified acquisition threshold” (\$150,000 in 2013), the CO may authorize the “short selection process,” where the RLS obtains SF-330s from at least three qualified firms. Competition under this process may be limited to Small Businesses or Emerging Small Businesses, as defined by the Small Business Administration. Publishing a solicitation is not required for short selection, but a notice of the proposed action is published for a shorter period of time.

(3) Sole Source: In cases where there is a clear and significant advantage to the Government, the CO may award a contract by “other than full and open competition,” or “sole source.” This is not common or encouraged, and a request for a sole source award needs to be carefully documented. A typical example would be where a private surveyor has already completed most of a project for a landowner adjoining a refuge and can survey a segment of refuge boundary for a much lower price than any other firm.

D. Contractor Evaluation. For projects with an expected total cost over the simplified acquisition threshold (\$150,000 in 2013), a selection panel evaluates the contractors. Typically, the RLS chairs the panel and acts as project COR. The panel should be composed of at least three land surveyors or other qualified professionals as directed and approved by the CO. The CO will provide the panel with the SF-330s that have been received from prospective contractors and blank evaluation summary forms. Each panel member individually evaluates each contractor’s SF-330, using a rating form similar to that shown as Exhibit 16a and 16b. Then the panel convenes and compares their respective evaluations of each contractor, with the objective of arriving at a consensus on the relative ranking of the firms. When this has been achieved, the chair fills out the form listing the firms evaluated and their final ranking, along with a brief explanation of how the process was carried out, and the relative qualifications of the firms.

If the CO authorizes the short selection process, the chair of the panel performs the evaluation and completes the Architect-Engineer Services Short Selection Report.

10.5 Preparing the Contract Package.

A. Types of Contracts. Before any contact with prospective contractors, the RLS consults with the CO, who will determine the most efficient contract type that will meet the customer’s needs. Although there are many different types of contracts, the two that are most commonly used in the Service for obtaining survey services are the fixed-price contract and the Indefinite Delivery/Indefinite Quantity (IDIQ) contract.

(1) Fixed price contract (FAR 16.2). In this type of contract, there is no price adjustment based on the contractor’s costs. It is suitable for projects where there are realistic estimates of the probable cost of performance. Since survey projects often contain significant degrees of uncertainty due to unknown conditions, the contract may need to be structured so as to contain optional line items that the Government may order if required. The fixed-price contract is a “stand-alone” document, issued to a single contractor for completion of a single project. Technical specifications describe exactly how the contractor must perform the survey services, and an SOW gives the specific details of the project location and quantities.

(2) Indefinite Delivery/Indefinite Quantity (IDIQ) contract (FAR 16.5). A land surveying program may require many surveys on short notice and at irregular intervals. In this case, the time and effort required to advertise and evaluate contractor proposals for each project becomes a burden on the program. For this reason, many Regions have adopted the IDIQ contracting model.

The IDIQ contract is a fixed-price contract that doesn't relate to a specific project. Rather, a contract is awarded to one or more firms for a fixed period of time, typically for 1 year with 4 option years. As project needs are identified, we issue individual Task Orders (TOs). An IDIQ contract is typically awarded based on full and open competition under a single solicitation, and we often award them to one or two contractors per geographic area. The contract specifies the minimum and maximum dollar volume of services that we plan to order. Usually these contracts are established on the basis of fixed unit prices for labor and specified allowable costs, valid for the entire period specified.

Since it does not address any specific project, the IDIQ contains only the technical specifications that describe the nature and range of the services that may be required, along with examples of finished work products. When we identify an actual survey need, we develop an SOW that describes the details of the specific project, and the COR gives an IGE based on the fixed contract rates to the CO. The contractor prepares a proposal, and after the CO negotiates a fair and reasonable fee, we issue a TO to the contractor.

B. Developing the Technical Specifications and the SOW. An accurate and complete description of the services that are required is the basis of a successful survey contract.

(1) The technical specifications (known as "Section C") contain the general description and the procedures for the services that may be ordered under the contract.

(2) The SOW identifies the specific location, timeline, and quantities of work that are required for the project, without repeating the terms in the Technical Specifications. CGS provides the formats for the SOW, which may vary among Regions.

(3) Checklist of items to include in an SOW: To the extent possible, the SOW for a cadastral survey project should identify the following information:

- The exact location of the project
- The exact nature of the work
- The survey and title history of the project area
- Specific instructions on corners to search for, tie, or re-monument; list any controlling features that need to be tied
- Specific suggested corner restoration techniques
- Requirement to receive approval from the COR before setting monuments (even if this is in the technical specifications, it bears repeating)
- Specific corners to monument
- Specific location and specifications for boundary clearing and posting
- As much information as possible on the conditions on the ground
- Special conditions or requirements requested by the field station (fire hazards, environmental damage)
- Access points to the site, especially through Service lands
- Provisions for neighbor contact and access permission
- Contact information and requirements for the field station and the COR
- Time requirements
- Address, timing, amount, and procedures for submitting progress invoices
- A project map clearly showing the boundary to be surveyed with the location of controlling corners, corners to be monumented, lines to be posted, etc. overlaid on an aerial photo or quad map
- Supporting information such as deeds, surveys, title reports

C. Dealing with uncertainties. It is in the nature of land surveying that information having a significant impact on the cost of a project is unknown until identified during the course of the survey. Since most survey contracts are fixed-price, it is important to find an equitable way to deal with these unknown conditions. A contractor who recognizes unknown conditions may assume a worst case scenario, and will increase the proposed fee significantly to account for the risk that they are asked to assume. On the other hand, a contractor who does not recognize potential unknown conditions may assume a best case scenario, which could end up with them being unable to perform or filing a contract claim.

(1) Some of these unknowns may include:

- (a) The existence and condition of controlling corner monuments or accessories;
- (b) The existence of survey, title, or other historical records that provide a legal basis for boundary resolution; and
- (c) An accurate understanding of access and site conditions.

(2) A site visit by the RLS that includes local research and preliminary corner search work is the best way to avoid or minimize unknown impacts. It helps the RLS to write an SOW that better reflects the requirements of the project.

(3) If a site visit is not possible, then it is best to work closely with the CO who provides direction, and with the customer, who will have to approve the contract funding. There are a number of ways to deal with uncertainty:

(a) Optional unit pricing: This is appropriate when you know the cost per unit of a certain work item, but not the actual number. For example, the total number of corners to search for and monument may depend on the results of the searches themselves. As a part of the proposal, you can ask the contractor to provide a unit price for each corner search and each monument established. Then you structure the TO or purchase order so that the bulk of the project, including the minimum number of corners to search for and monuments to set, is in a single line item with a lump sum price, while a reasonable estimate of the number of additional searches and additional monuments to set are added as two additional line items. If additional searches are required, the contractor asks for authorization from the COR before starting work. The COR specifies the number of additional units. "Unused" work items are left unbilled and de-obligated at the end of the contract. You can add work items by modifying the TO.

(b) Time and materials: Sometimes there are situations where you can't predict the complexity or production rate of the work, so a prudent contractor won't be willing to assume the risk of a fixed fee without charging an exorbitantly high risk premium. In this situation, the CO may approve a time and materials pricing structure. The CO obligates an amount equal to the "worst case scenario," and the contractor proposes to charge at the fixed rates for only the effort actually expended on the uncertain portion of the project, up to the obligated amount. This type of proposal requires that you monitor the contractor closely to ensure that they're working efficiently and submitting accurate cost records. Consider using this type of contract only when the contractor has a good performance history.

(c) Phasing: In this approach you task the contractor with carrying out an initial assessment that may include research, corner search, and landowner contact. When they return the results of that assessment, the RLS has a factual basis for preparing an SOW for the rest of the project. This can be done as two separate TOs on an IDIQ contract, or as a modification to a single fixed price contract. If using a fixed price contract, the CO may need to obligate an amount equal to the estimated total project cost when the CO awards the contract.

10.6 Independent Government Estimate (IGE) and Contractor's Fee Proposal.

A. Cost Estimate. Before the CO provides the SOW to the contractor with a request for a fee proposal, the RLS has to have prepared an IGE of the cost. An accurate cost estimate is required for the Service customer to plan for and approve the project funding, and for the CO to determine whether a contractor's fee proposal is fair and reasonable. Developing the estimate requires an accurate understanding of:

- (1) The specific work items to be accomplished,
- (2) Production rates, in the context of the conditions in the project area, and
- (3) Reimbursable costs that the contractor will incur, such as travel costs, equipment rental, and recording fees.

The CO gives the RLS specific guidance on the unit costs to use when preparing the estimate. Travel costs, such as vehicle mileage and per diem, are capped at the standard GSA rates for the project area. A spreadsheet or series of spreadsheets is a convenient way to prepare and document the estimate. The cost estimate is confidential; unless directed otherwise by the CO, you should only share it with other Government employees whose official duties require that knowledge.

B. Fee Proposal. The CO is responsible for discussions with the contractor regarding their fee proposal. The CO determines whether the contractor's unit labor and other costs are reasonable, and the role of the RLS is to advise the CO if the level of effort proposed by the contractor to complete the work is reasonable. The RLS or other Government staff should never discuss the fee proposal with the contractor unless the CO directs otherwise.

When the contractor's proposal is received, the CO typically asks the RLS to review it for consistency with the IGE. A significant difference from the IGE, either more or less, may indicate the contractor misunderstood the requirements of the SOW, the site conditions, or other aspects of the project, or that the RLS needs to revisit his/her/their requirements. The CO may hold discussions with the contractor to identify and resolve any differences; the RLS may be a party to these discussions or may, at the CO's direction, carry them out independently.

In the course of these discussions, the RLS may revise the SOW and IGE to reflect a more accurate description of the project requirements, and the contractor may submit revised proposals. When a fee proposal is received that is consistent with the IGE, the RLS typically provides the CO with a written analysis of the proposal and a recommendation that it be considered fair and reasonable.

10.7 Contract Administration.

A. Duties of a COR. When the CO awards a survey contract, he/she/they typically appoints an RLS, or a land surveyor designated by the RLS, to be the COR. To serve as the COR on any contract, the RLS (or the designated land surveyor) must be certified by the Department. Departmental certification currently requires a 40-hour training course every 4 years, with 20 hours per year of refresher training. After completing the approved training, the prospective COR applies for certification through CGS. If accepted, the COR gets a certificate bearing the COR certification number. This number will be placed on every invoice that the COR approves for payment. For complete and up-to-date information on the duties of the COR, refer to the Contracting Officer's Handbook: <https://sites.google.com/a/fws.gov/co-handbook/>

- (1) The COR is expected to:
 - (a) Provide accurate and objective information on the technical issues involved in the contract,
 - (b) Provide the contractor with required Government-furnished information and property,
 - (c) Ensure good communication between the contractor and the field station,

- (d) Track the contractor's progress,
- (e) Review deliverables,
- (f) Approve payments,
- (g) Provide advice to the CO on questions, issues, or disputes, and
- (h) Keep a daily log of conversations and important events concerning contractor performance.

(2) The COR does not:

- (a) Direct the work of the contractor, or
- (b) Order the contractor to start or stop work.

Only the CO can do this.

B. Pre-Work Meeting. It is important to have a pre-work meeting, if possible, with the CO, the COR, the field station manager, if applicable, and the contractor's representative who will have day-to-day oversight of the project. Often the contractor's representative has not been involved in preparing the proposal, and he/she/they may not have read the SOW or the contract carefully. Following are some important items to cover in the pre-work meeting:

- (1) SOW;
- (2) Technical specifications of the IDIQ contract, if applicable;
- (3) Included and referenced FAR clauses;
- (4) Government-furnished information or materials;
- (5) Project work schedule and due dates;
- (6) Process for ordering optional items;
- (7) Process for submission of progress invoices. Depending on the FAR clauses that the CO has referenced in the contract, there may be a limit on how often the contractor can submit progress invoices, and there may be a limit to the proportion of the total contract cost that can be paid prior to completion of the work; and
- (8) Coordination with the field station on local conditions such as access, environmental conditions, fire safety, and points of contact.

C. Contract Schedule. Depending on the nature of the project, there are different ways to track the contractor's progress. You can have the contractor send regular reports (weekly, monthly, etc.) when there is active work. Keeping a daily log of the contractor's progress relative to the contract delivery date is very important. On a fixed-price contract, a delay in completing the contract that is not the fault of the Government may trigger a monetary penalty to the contractor. The COR should discuss this with the CO and the contractor early in the project so that the contractor has the maximum incentive to complete on schedule and avoid any disputes.

D. Pre-Monumentation Review. Reviewing and discussing the contractor's methods, boundary calculations, and decisions before monumentation is perhaps the most important step in administering a successful cadastral survey contract. Depending on the size and nature of the project, this may involve a

simple map check, a long conversation, or an examination of the computations. The COR needs to completely understand the project, including the contractor's control network and closures, descriptions of monuments found, record surveys, and deeds used to calculate or verify lines of written title, as well as monuments the contractor is proposing to set. If there are problems with the decisions that the contractor has made, it will take good judgment and tact on the COR's part to suggest alternate methods and approaches. Suggesting alternative methods is usually more successful if the contractor has less financial interest in defending decisions that they have already made and monumented. If there are professional disagreements with the contractor, it is important to notify the CO right away.

10.8 Intra- and Inter-Agency Agreements (IAAs). Intra- and Inter-Agency Agreements (IAAs) are methods the Service may use to obtain land survey services from other Departmental bureaus and Federal agencies. The bureau/agency that is providing the products or services bills us using the Intergovernmental Payment and Collection System (IPAC). The Interior Business Center (IBC) makes payments and processes them against the Service cost code(s) provided on the IAA form.

Unlike fixed-fee lump sum contracts, the selling bureau/agency only spends the funds it requires to complete the work (and isn't entitled to a fixed sum). Most of our agreements for buying land survey services are IAAs with the Bureau of Land Management (BLM), which is the focus of this section. Refer to 264 FW 2 for additional IAA policy and procedures.

A. Inter-Agency Agreements. Inter-agency agreements are agreements with other Federal agencies outside of the Department to obtain products or services. A warranted Contracting Officer (CO) from Contracting and General Services (CGS) issues and manages these agreements. Many of the elements of an inter-agency agreement are the same as an intra-agency agreement, but you should consult with your CO on the details of planning the agreement. We must use FWS Form 3-2366, United States Department of the Interior Inter/Intra-Agency Agreement for intergovernmental transactions, when we are the paying entity. See 264 FW 2, section 2.11, for specific clauses that should be included in the agreement.

B. Intra-Agency Agreements. Intra-agency agreements are agreements where we contract with other bureaus within the Department to obtain products or services. Since the implementation of the Financial and Business Management System (FBMS) at the beginning of FY 2012, Service memorandum - *Proper Recording of Obligations and Prior Year Recoveries* requires the use of the miscellaneous obligation process to obligate funds for the Intra-agency agreements. We must use FWS Form 3-2366, United States Department of the Interior Inter/Intra-Agency Agreement for intergovernmental transactions, when we are the paying entity. Refer to 264 FW 2, section 2.11, for the specific clause that should be included in the agreement. Intra-agency agreements do not involve CGS and a CO, and so are not subject to year-end acquisition deadlines.

C. Overhead Charges and Service First Agreements. Cost recovery is the process of recouping all costs (both direct and indirect) associated with providing goods or services to the Service. When the Service enters into an IAA with another agency/bureau, the servicing agency follows the agency/bureau policy to determine the appropriate overhead fee. That's an amount of money that cannot be charged as belonging exclusively to any particular part of the project or service (overhead) being performed by agency/bureau personnel (e.g., rent, electricity, administrative support, general office expenses, depreciation, etc.). For example, if the Service enters into a cadastral survey IAA with BLM, BLM will assess an overhead fee for the agreement based on their bureau policy. The Service may work with the other agency/bureau to determine an acceptable overhead rate.

The Service First program, created by Congress in 2000 and made permanent in 2012, authorizes cooperation among the Service and BLM, the U.S. Forest Service, and the National Park Service (NPS). It was established using Memoranda of Understanding (MOU) among the four agencies, and allows each agency to waive overhead fees "...provided that there is mutual benefit and the Agency determines that the waiver will not result in a significant financial impact." The servicing agencies (BLM, FWS, U.S. Forest Service, and NPS), should follow their Service First agreement to negotiate and waive overhead fees.

D. Authorities. Preparing an IAA requires you to identify the authority for acquiring the survey services. The authority we generally cite for land survey agreements is the Economy Act, 31 U.S.C. 1535. If this is the case, a “Determination and Findings to Support the Use of the Economy Act,” signed by the Realty Officer or Project Leader, must accompany the agreement package. This certifies that the Service cannot conveniently or economically obtain the supplies or services by contracting directly with a private source, that an IAA is in the best interest of the Government, and that it is authorized under the Economy Act.

E. Intra-Agency Agreement Process.

(1) The IAA is based on a project description, similar to the SOW used in FAR contracts, and it can use the same format as an SOW. The details of the project and the estimated cost are worked out directly with the other agency/bureau’s land surveyor. Since the selling party is not obligated to their estimated cost, the Service personnel must describe the project and review the cost estimate carefully.

(2) When there has been a meeting of the minds among the two land surveyors and the Service program manager (Realty Officer or Project Leader) as to project goals and cost, the Regional Land Surveyor prepares a draft IAA consisting of:

(a) An IAA form (with the agreement number left blank),

(b) A project description document with maps and diagrams,

(c) Forms or information requested by the selling agency (such as the BLM Cadastral Survey Request form), and

(d) An Economy Act statement (if required).

(3) The draft IAA package is sent to the selling party for review and for filling in the specific names, contact information, billing codes, and other bureau information.

(4) When the package is in final form, the Assistant Regional Director (typically, the Regional Refuge Chief) signs it and sends it to the selling agency for their Project Officer’s signature (typically, the State Chief Cadastral Surveyor).

(5) The fully executed IAA package, along with an approved and certified Acquisition Request, is given to the person who can issue a miscellaneous obligation (MO) in FBMS to fund the IAA. The MO number serves as the agreement number.

(6) The issuing person adds the MO number (agreement number) to the IAA form, and provides a copy of the signed and obligated agreement to both parties.

Survey Tract Review Check List

The items checked below are those that need to be evaluated and analyzed during the Survey Tract Review. Depending on the conditions found, the review may include additional items.

General Information

- What is the status of the parcel, surface, and/or subsurface (e.g., public domain, acquired, fee, restricted fee, trust under appraisal, signed purchase agreement, preliminary inquiry)?
- What is the legal description reference (title report # / deed reference)?
- What documents were used in this review?
- What is the type of transaction or project (fee acquisition, easement, exchange, disposal, etc.)?

Location and Physical Attributes

- General location (township, range, section/town, county, State)?
- Special locational or physical attributes?
- Is the parcel within a special unit boundary (e.g., approved Refuge boundary)?
- Is the parcel bounded by natural and/or artificial features?

Accuracy and Sufficiency of the Proposed Legal Land Description

- Does the land description describe the entire parcel intended and only that parcel?
- Is it consistent with the vesting deed?
- Does it contain errors, such as wrong lot or section numbers, or missing words or phrases?
- Does it close mathematically?
- Does it contain correct and sufficient bounding and monument calls?
- Is the form and language clear?
- Is the description in harmony with adjoining parcels?
- Has the land description changed from previous documents for the same parcel?

Area

- What is the computed area of the land description?
- How does the computed area compare with area figures given by other record sources:
 - General Land Office/Bureau of Land Management surveys
 - Other surveys
 - County assessors
 - Aerial imagery / combined GIS
- What is the approved area for use as the parcel acreage?

Access

- What type of access is there to this parcel (e.g., fee, easement, unwritten, RS 2477)?
- Where is the access located?
- Is the access covered in its entirety by written conveyances?
- If the access is via a written document:
 - What is the width of the access?
 - Does the establishing document contain limitations (e.g., access only, access and utilities, administrative use only)?

Title Exceptions

- For any special exceptions listed on a title report or policy:
 - Do they all relate to the subject parcel?
 - Where are they located and what effect do they have?
 - Are there any missing exceptions?

Encumbrances Evident from Imagery, Record Sources, or Verbal Communication:

- What are the apparent uses, e.g., fence encroachment, agricultural trespass, etc.?
- Where are they located?
- What are the possible effects on the parcel?

Boundary Status

- Has the parcel been surveyed, the corners monumented, the boundaries marked?
- Quality of the BLM Geographic Coordinate Data Base (GCDB), error estimates?
- Have the adjoining parcels been surveyed?
- Do the surveys appear to be correct?
- Are there conflicts in the survey records, such as disputes over controlling corners?
- Do the survey records disclose discrepancies between occupation and the lines of written title?

Survey: Check those that apply.

- No survey anticipated
 - Existing survey is sufficient
 - Inholding
 - Natural boundary
 - Active acquisitions on adjoining parcels
- Limited survey: Retracement of existing survey
 - Posting recommendations
- Survey anticipated for intended purpose
 - Create legal land division
 - Create acceptable land description
 - Determine actual acreage
 - Monument and post high risk/high priority boundary
 - Resolve occupational discrepancy

Checklist for Writing a Legal Description

Writing the Preamble of the Legal Description

The preamble of a legal description, often only one paragraph in length, contains vital information.

- Name of unit or area
- Agency or jurisdiction
- Location information for unit or area
 - State, territory, or possession
 - County, borough, or parish
 - District, municipality, city, town, or village
 - Subdivision: name, number, date, and place of recording
 - Legislative plat or map: law number, date, title, or other information necessary for identification
 - Public Land Survey System: township, range, section, lot, aliquot part
 - Land Grant: name, date, court case number, and other identifying information
 - Chart or map: name, number, sheet number, date published
- Grantor's derivation of title: recorded document: book and page, where filed, date, title, and other identifying information
- Identification of adjacent landowners or administrators (junior/senior rights)

Writing the Description: General Guidelines

The information should be presented for easy verification.

- Use a colon to end the preamble
- Begin each course or set of conditions on a new line of text
- Underline, boldface, capitalize, or italicize important aspects of the description (such as Point of Beginning)
- Use a semicolon to end each course or set of coordinates

Writing style should be consistent and clear.

- Avoid unnecessary capitalization
 - Do not capitalize adjective describing a line (e.g. southwesterly along the line of mean high tide)
- Do not use abbreviations (e.g., use North instead of N; feet instead of ft.)

Writing the Body of the Legal Description

- Point of commencement
- Point of beginning
- Physical monument, found or set
- Directions
 - Basis of bearing (astronomic, magnetic north, assumed, grid)
 - All bearings must be on the same basis
 - Directional calls along a natural monument (e.g., along a shoreline)
 - Bearings: correct quadrant (northeast, southeast, southwest, northwest)
 - Azimuth: definition of reference meridian (north or south)
 - Grid: definition of reference meridian
- Distance: consistent units and definition of units
- Curves: adequate information supplied
 - Curves are considered tangent unless otherwise stated
 - At least two parameters to a horizontal distance

- Tangent distance
 - Radius
 - Chord distance
 - Arc distance
 - Deflection angle
 - Delta angle
 - Degree of curvature (arc or chord)
 - Direction of curvature (a curve can have adequate parameters to describe it, but the direction it bends or arcs may still be unknown)
 - Direction of curvature
 - Direction of radius at point of intersection or point of tangency
 - Deflection: left or right
 - Curves: tangent or not
- Coordinate: adequate information
 - Geographic position (latitude/longitude)
 - Plane coordinates
 - Procedure used to determine coordinates
 - Control used to determine coordinates
 - Datum used for coordination
 - State plane/UTM coordinates
 - Reduction applied (convergency, scale, elevation factors)
 - Datum (e.g., North American Datum 1927 or 1983, etc.)
 - Realization and epoch date (e.g., NAD 83 (2011) epoch 2010.00)
 - References to system used (zone, state, local, city, or project datum)
- Mathematics
 - Units
 - All bearings and distances on same reference system, and figure should close mathematically
 - Consistency of part (length of arc, central angle, radius, etc.)
 - All coordinates on same reference system
 - All lines and parts defined by consistent dimensions
 - Consistency of significant figures
- Tidal datum
 - Mean High Water (MHW)
 - Mean High Tide (MHT)
 - Mean Low Water (MLW)
 - Mean Low Tide (MLT)
 - Extreme Low Tide (ELT)
- Non-tidal datum (river and lakes) Ordinary High Water Mark (OHWM)
 - Ordinary Low Water Mark
 - Low Water Mark
- Area
 - Units (acres or hectares)
 - Land component
 - Water component

Writing the Clauses and Certifications

- Clauses
 - Limiting clauses (all easements) (“Subject to”)
 - Augmenting clauses (“Together with”)

- Certification of description
 - Author, title
 - Agency, date

DESCRIPTION
OF THE
THOMAS AND SHERRI MCNULTY TRACT
(287)
CAPE MAY COUNTY, NEW JERSEY

The tract of land described in this document is located in the State of New Jersey, Cape May County, Cape May Court House, situate approximately 3.0 miles westerly of the center of Cape May Court House and north of and adjacent to Springers Mill Road (33' wide), being all of the land conveyed from Roswita H. Jones, individually and Edward P. Ryan, Substitutionary Administrator of the Estate of Allen G. Jones to Thomas and Sherri McNulty, in a Deed dated October 26, 2001, recorded in Deed Book 2936, Page 646, on file at the Clerk's Office of said County and State at Cape May Court House and being more particularly described as follows:

The bearings in the following description are based on the New Jersey State Plane Coordinate System, NAD 1927. Distances are grid distances. To convert to ground distances, divide by the combined factor of 0.99997900.

Being all of Block 164.01, Lot 87.02 of the Cape May County Tax Maps.

BEGINNING at Corner 2002, being Corner 2002 of the UNITED STATES (TRACT 286) and also a corner of land, now or formerly of Robert E. Bongiovanni, a standard USF&WS aluminum monument found;

Thence N08°55'22"E, along land of the UNITED STATES (TRACTS 286,-I), 370.77 feet to the UNITED STATES (TRACT 214a-I) and Corner 13051;

Thence S64°40'51"E, along the UNITED STATES (TRACT 214a-I), 243.28 feet to land, now or formerly of Amber Waddington and Corner 13052;

Thence S8°55'37"W, along land, now or formerly of Amber Waddington, passing on line an iron pipe found at 99.50 feet, continuing a total distance of 678.25 feet to land, now or formerly of PMB By The Sea, LLC and Corner 13007, an iron pin and cap found;

Thence N67°51'56"W, along land, now or formerly of PMB By The Sea, LLC, 48.91 feet to Corner 13004, an iron pin and cap found;

Exhibit 3

Thence S22°12'58"W, along the same, 174.49 feet to the northerly right of way line of Springers Mill Road (33' wide) and Corner 13018, an iron pin and cap found, from which a concrete monument found bears, S67°49'53"E, 90.02 feet;

Thence from Corner 13018, N67°57'38"W, along the northerly right of way line of said road, 149.50 feet to land, now or formerly of James Dowd and Corner 2041, a concrete monument found;

Thence N8°55'21"E, along land, in part, now or formerly of James Dowd and Robert E. Bongiovanni, passing on line a concrete monument found at 425.87 feet, continuing a total distance of 500.87 feet to the PLACE OF BEGINNING, containing 4.35 acres, more or less.

The above-described tract of land is delineated on a plat designated as the THOMAS AND SHERRI MCNULTY TRACT (287), bearing the date of July 29, 2013, of record in the files of the Department of the Interior, U.S. Fish and Wildlife Service, Office of Realty, located at 300 Westgate Center Drive, Hadley, Massachusetts 01035-9589. A print from that plat is attached.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
DIVISION OF ENGINEERING

TRACT DESCRIPTION
OF THE
CALVIN HOSMER, JR. TRACTS
(29,a,b)
YORK COUNTY, MAINE
COASTAL MAINE NATIONAL WILDLIFE REFUGE
BRAVE BOAT HARBOR DIVISION
CONTAINING 17.9 ACRES

PURCHASE APPROVAL
July 26, 1966

REPORT PREPARED BY
Joseph L. Daigle
Cadastral Surveyor
April, 1967

DESCRIPTION
OF THE
CALVIN HOSMER, JR. TRACTS
(29,a,b)
YORK COUNTY, MAINE

The hereinafter-described three (3) tracts of land are located in the State of Maine, York County, Town of York, situate about 2.8 miles south of York Village and 0.7 miles east of Brave Boat Harbor Road, and being more particularly described as follows:

TRACT 29

Being part of the land conveyed to Calvin Hosmer, Jr. from Joseph L. Badger, et ux in a Quitclaim Deed dated August 29, 1949, recorded in Book 1140, Page 62, on file at the Registry of Deeds of said County and State at Alfred.

BEGINNING at Corner 1, being Corner 1 of the CALVIN HOSMER, JR. TRACT (29b), a 2" iron pipe set, on the easterly sideline of the abandoned Atlantic Shore Line Railway Company right-of-way, about 2,190 feet north of the townline between the Towns of York and Kittery; thence from Corner 1, S 50° 32' E, leaving said railway right-of-way, 212.65 feet to Corner 2, a 2" iron pipe set; thence S 04° 13' E, 517.89 feet to Corner 3, a 2" iron pipe set; thence S 09° 00' E, 429.35 feet to Corner 4, a 2" iron pipe set, being Corner 4 of the UNITED STATES (TRACT 27a); thence S 22° 30' E, 200.0 feet, more or less, to Corner 5 in the centerline of a creek in Broad Cove; thence N 87° 00' W, in part, along the centerline of said creek, 400.0 feet, more or less, to Corner 6, on the easterly sideline of aforesaid railway right-of-way; thence N 06° 30' E, along the sideline of said right-of-way, 1250.0 feet, more or less, to the PLACE OF BEGINNING, containing 7.4 acres, more or less, and

BOUNDED from Corner 1 to Corner 4 by other land of Calvin Hosmer, Jr.; from Corner 4 to Corner 1 by land of UNITED STATES (TRACT 27a).

TRACT 29a

Being part of the land conveyed to Calvin Hosmer, Jr. from Alphanse F. Raynes in a Warranty Deed dated August 8, 1957, recorded in

Book 1352, Page 25, on file at the Registry of Deeds of said County and State at Alfred.

BEGINNING at Corner 1, on the mean low water line of Brave Boat Harbor; thence Westerly and Northerly along said mean low water line, 730.0 feet, more or less, to Corner 2, being Corner 7 of UNITED STATES (TRACT 27a), the intersection of said mean low water line and the centerline of a Creek; thence Northerly along the centerline meanders of said Creek through Broad Cove, 1550.0 feet, more or less, to Corner 3; thence N 47° 44' W, leaving said Creek 148.64 feet to Corner 4, being Corner 5 of UNITED STATES (TRACT 27a), a 2" iron pipe set; thence S 79° 14' E, 95.64 feet to Corner 5, a 2" iron pipe set; thence S 37° 11' E, 416.32 feet to Corner 6, a 2" iron pipe set; thence S 58° 00' E, 270.76 feet, to Corner 7, a 2" iron pipe set; thence S 64° 29' W, 443.68 feet to Corner 8, a 2" iron pipe set; thence S 43° 50' W, 515.47 feet to Corner 9, a USF&WS standard concrete monument set and marked "Corner 9, CALVIN HOSMER, JR. TRACT 29A, CALVIN HOSMER, JR. 1967"; thence S 50° 08' E, 415.54 feet to Corner 10, a 2" iron pipe set; thence S 06° 42' E, passing in line at 80.36 feet, a 2" iron pipe set, a total distance of 360.0 feet, more or less, to the PLACE OF BEGINNING, containing 10.4 acres, more or less, and

BOUNDED from Corner 1 to Corner 2 by the mean low water line of Brave Boat Harbor; from Corner 2 to Corner 4 by land of the UNITED STATES (TRACT 27a); from Corner 4 to Corner 1 by other land of Calvin Hosmer, Jr.

TRACT 29b

Being part of the land conveyed to Calvin Hosmer, Jr. from Alphanso F. Raynes in a Warranty Deed dated August 8, 1957, recorded in Book 1352, Page 25, on file at the Registry of Deeds of said County and State at Alfred.

BEGINNING at Corner 1, being Corner 1 of the above-described CALVIN HOSMER, JR. TRACT (29), a 2" iron pipe set, on the easterly sideline of the abandoned Atlantic Shore Line Railway Company right-of-way; thence N 87° 30' W, 20.00 feet to Corner 2, being Corner 1 of the

MALCOLM S. PAYNE, EST. TRACT (26b) the centerline of said right-of-way; thence N 02° 30' E, along the centerline of said right-of-way, 233.98 feet to Corner 3; thence S 87° 30' E, 20.00 feet to Corner 4, the easterly sideline of said right-of-way, a 2" iron pipe set; thence S 02° 30' W, along the easterly sideline of said right-of-way, 233.98 feet to the PLACE OF BEGINNING, containing 0.1 acres, more or less, and

BOUNDED from Corner 1 to Corner 2 by land of UNITED STATES (TRACT 27a); from Corner 2 to Corner 4 by land of the MALCOLM S. PAYNE EST. TRACT (26b); from Corner 4 to Corner 1 by other land of Calvin Hosmer, Jr.

The above-described three (3) tracts of land, containing, in the aggregate, 17.9 acres, more or less, are delineated on a map tracing designated CALVIN HOSMER, JR. TRACTS (29,a,b) bearing date of May 8, 1967, of record in the files of the Department of the Interior. A print from that map tracing is attached.

SUR # 3306782 1/2

LEGAL DESCRIPTION

TRACT 26
All those portions of the Northeast Quarter of Section 24, and those portions of the Southeast Quarter of the Southeast Quarter of the Northeast Quarter of Section 13, in Township 17 North, Range 3 West, Willamette Meridian, Thurston County, Washington, lying westerly of the following described line.
Commencing at the Southwest Corner of the Northeast Quarter of the Northeast Quarter of said Section 24;

EASEMENT DESCRIPTION

TRACT (26R)
A strip of land in the Southwest Quarter of Section 19, Township 17 North, Range 2 West, and in the Southeast Quarter of Section 24, Township 17 North, Range 3 West, Willamette Meridian, Thurston County, Washington, said strip of land being 30.00 feet wide and lying 15.00 feet on each side of the following described centerline:
Commencing at the Southeast corner of Section 24, Township 17 North, Range 3 West, Willamette Meridian; thence along the east line of the Southeast Quarter of said Section 24 and the beginning of said easement; thence following the centerline of said existing access road South 66'29'21" West, 67'28 feet; thence South 84'28'45" West, 23.90 feet; thence North 83'22'03" West, 54.40 feet; thence North 70'26'27" West, 43.46 feet; thence North 66'55'28" West, 50.48 feet; thence North 63'13'01" West, 91.98 feet; thence North 65'01'24" West, 65.62 feet; thence North 70'19'48" West, 100.25 feet; thence North 74'15'36" West, 106.15 feet; thence North 70'50'16" West, 76.09 feet; thence North 64'51'17" West, 73.24 feet; thence North 56'12'45" West, 36.44 feet; thence North 51'00'40" West, 27.69 feet; thence North 45'02'13" West, 30.21 feet; thence North 42'24'44" West, 49.37 feet; thence North 35'00'28" West, 140.98 feet; thence North 29'41'05" West, 126.62 feet; thence North 26'33'16" West, 187.27 feet; thence North 23'45'18" West, 157.61 feet; thence North 24'52'07" West, 200.03 feet; thence North 15'30'56" West, 102.33 feet; thence North 21'07'58" West, 96.95 feet; thence North 07'18'43" West, 50.64 feet; thence North 11'37'09" West, 32.88 feet; thence North 03'35'38" West, 35.87 feet; thence North 01'28'47" East, 365.83 feet; thence North 21'55'28" West, 49.85 feet; thence North 02'27'31" East, 159.77 feet; thence North 05'35'38" East, 56.13 feet; thence North 02'27'31" East, 159.77 feet; thence North 21'55'28" West, 49.85 feet to the West line of the Northeast Quarter of the Southeast Quarter of said Section 24, said point being South 1'28'47" West, 409.19 feet from a 1" iron pipe tagged "Ls 19642 Solomon", marking the center east sixteenth of said Section, and the western terminus of said centerline;

Thence continuing said easement from aforementioned point "A" on the centerline of an existing access road, following the centerline of said existing access road; North 55'09'30" East, 391.66 feet; thence North 53'33'22" East, 247.06 feet; thence North 63'35'21" East, 51.85 feet; thence North 71'56'45" East, 49.69 feet; thence North 80'47'18" East, 60.70 feet; thence North 88'09'21" East, 71.52 feet; thence North 87'54'15" East, 241.31 feet; thence South 82'56'24" East, 90.22 feet; thence North 88'09'57" East, 96.14 feet; thence South 80'41'57" East, 91.89 feet; more or less to the centerline of Litterlock road, and the eastern terminus of said centerline.

Excluding therefrom any portion lying within the existing right-of-way of Litterlock road The sidelines of said strip shall be prolonged or shorten to terminate at the same endlines as the centerline.
TRACT (26R1)
A strip of land in the Southeast Quarter of the Northeast Quarter of Section 24, Township 17 North, Range 3 West, Willamette Meridian, Thurston County, Washington, said strip of land being 30.00 feet wide and lying 15.00 feet on each side of the following described centerline:

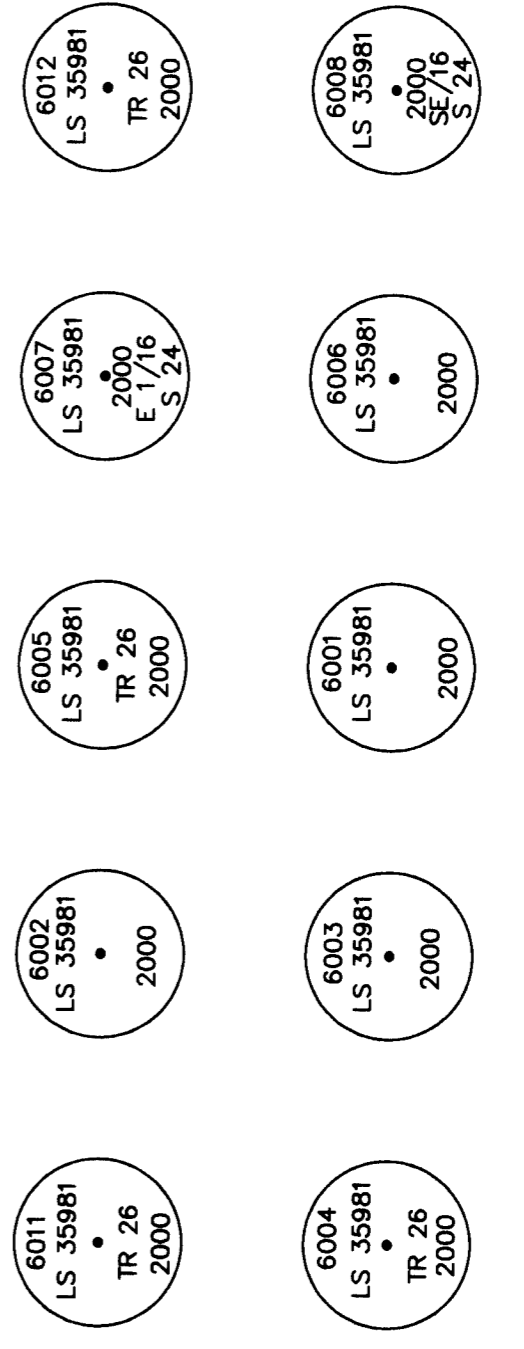
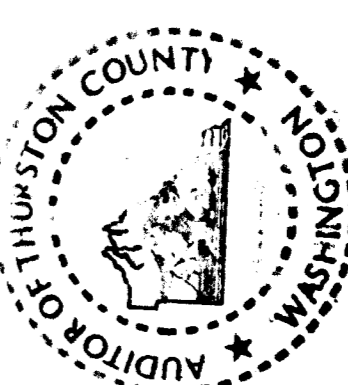
Beginning on the West line of the Southeast Quarter of the Northeast Quarter of said Section 24, North 01'31'49" East, 679.81 feet from a 1" iron pipe tagged "Ls 19642 Solomon", marking the center East sixteenth of said Section as measured along said West line; thence along an existing dirt road North 19'12'25" East, 63.15 feet; thence North 16'28'10" East, 102.78 feet; thence North 13'21'26" East, 83.12 feet; thence North 08'48'42" East, 82.06 feet; thence North 01'40'27" West, 96.23 feet; thence North 00'24'44" West, 99.76 feet; thence North 20'23'59" East, 102.91 feet; thence North 29'31'41" East, 19.46 feet to the north line of the Southeast Quarter of the Northeast Quarter of said Section 24, and the terminus of said centerline, said terminus lying North 82'34'07" West, 300.46 feet from a USFWS aluminum cap and rebar, marked "6011 TR, 26, PLS 35981 2000".

The sidelines of said strip shall be prolonged or shorten to terminate at the same endlines as the centerline.

SET MONUMENTS OR TEMPORARY CONTROL POINT DESCRIPTION AND REFERENCE.

- #6001 49 FEET WEST OF CENTERLINE OF A 36 FOOT WIDE GRAVEL ROAD, 400 FEET OF NORTHERLY OF TREE LINE.
#6002 1 FOOT SOUTH OF 48" DIAMETER FIR STUMP, 0.8' LOWER THAN STUMP, 11 FEET WEST OF THE EDGE OF 30 FOOT GRAVEL ROAD.
#6003 15 FOOT SOUTH 15' WEST FROM 18" FIR STUMP WITH "PK" IN CENTER, AT TOP OF SLOPE OF WEST FACING RIDGE.
#6004 3.8 FEET SOUTH 16' WEST OF 18" FIR STUMP, 8.4 FEET NORTH 2' EAST FROM 14" FIR STUMP.
#6005 13 FEET NORTH OF 20 FOOT VERTICAL SLOPE AT NORTH EDGE OF GRAVEL PIT, 40 FEET SOUTHWEST OF 15"-20" FIRS.
#6006 15.0 FEET NORTH OF 20" FIR, 10.6 FEET WEST FROM 18" FIR, 9.0 FEET EAST FROM 3" FIR.
#6007 2.3 FEET SOUTH 65' EAST FROM 6" FIR, 5.0 FEET WEST SOUTHWEST FROM 26" FIR.
#6008 EAST 35 FEET 16" FIR, 45 FEET WEST SOUTHWEST FROM 26" FIR.
#6011 14.0 FEET NORTH 45' EAST FROM 16" STUMP, 27.0 FEET SOUTH 62' WEST FROM 30" STUMP, 22.4 FEET SOUTH 40' WEST FROM 22' STUMP.
#6012 8.7 FEET SOUTH 30' WEST FROM 24" FIR, 11.0 FEET SOUTH FROM 18" FIR, 17.5 FEET NORTH 5' EAST FROM 24" FIR.
#6050 SPIKE IN CENTER OF ABANDONED RAILROAD LINE @ SOUTH EDGE ACCESS ROAD 1000 FEET FROM LITTERLOCK ROAD.
#6051 SPIKE IN CENTER OF ABANDONED RAILROAD LINE 660 FEET SOUTH SOUTHWEST OF POINT 6050.
#6053 5/8" REBAR & CAP "RCA CONTROL" 250 FEET SOUTH OF POINT 6001 AT EAST EDGE 25 FOOT GRAVEL ROAD, 100 FEET NORTH OF TREE LINE.
#6054 "PK" AT NORTH EDGE OF PAVEMENT 150 FEET WEST OF TRUCK SCALE ON ACCESS ROAD.
#6055 5/8" REBAR & CAP "RCA CONTROL" 2200 FEET NORTH OF ACCESS ROAD IN CENTERLINE OF HIGH TENSION WIRE ROAD.
#6056 5/8" REBAR & CAP "RCA CONTROL" 360 FEET SOUTH OF POINT 6055 2.5 FEET EAST OF EAST EDGE HIGH TENSION WIRE ROAD.
#6057 HUB & TACK 25 FEET SOUTH OF SOUTH SIDE CENTER OF TOWER 3 LINE 1 MILE 17, EAST OF TWO TOWERS.
#6058 HUB & TACK 15 FEET NORTH AND 20 FEET EAST OF TOWER 3 LINE 1 MILE 17, WEST OF TWO TOWERS.
#6061 "PK" AT P.I. ACCESS ROAD AT WEST EDGE HIGH TENSION WIRES AT SOUTHWEST EDGE PAVEMENT.
#6062 HUB & TACK AT SOUTHWESTERLY EDGE OF 20 FOOT WIDE DIRT ROAD AT P.I. 800 FEET NORTHWESTERLY FROM 6061.
#6063 5/8" REBAR & CAP "RCA CONTROL" 75 FEET NORTH 45' EAST FROM SOUTHWEST PASTURE CORNER.
#6064 HUB & TACK 27 FEET EAST OF GATE AT 9144 WILSON AT NORTH EDGE GRAVEL DRIVEWAY.
#6068 HUB & TACK AT CUL DE SAC OF 95 TH, IN ISLAND ON SOUTH SIDE, NORTH OF NORTH EDGE OF PAVEMENT SOUTH OF 36" ROCK.
#6069 5/8" REBAR & CAP "RCA CONTROL" 9 FEET NORTH OF WELL CASING 700 FEET EAST OF 6068.
#6078 REBAR & CAP "RCA CONTROL" IN GAS EASEMENT AT CREST OF HILL 29.0 FEET NORTH OF CARSONITE SIGN, 32.0 FEET NORTHWEST OF #10 GAS LINE SIGN.
#6079 HUB & TACK UNDER WIRES 600 FEET SOUTH OF ACCESS ROAD 150 FEET EAST OF POINT 6007
#6080 HUB & TACK 70 FEET NORTH OF CENTERLINE OF TOWER 2 MILE 16 LINE 1 TOWER #74.
FOUND MONUMENTS
#6052 5/8" REBAR AT BASE OF RAILROAD SLOPE 27.8 FEET NORTH 84' EAST FROM 5"X5" SQUARE POST OLD FENCE PARALLEL WITH RAILROAD, 4.0 FEET NORTH 55' WEST FROM FACE OF 14" FIR, 10.5 FEET SOUTH 47' WEST FROM FACE OF 16" CEDAR.
#6059 1" IRON PIPE AT OLD FENCE POST NOW BROKEN OFF WITH DNR POSTER, 2.2 FEET NORTH 2' WEST FROM FACE OF 6" FIR, 14.3 FEET NORTH 84' EAST FROM FACE 5" FIR.
#6067 4"X4" CONC. MONUMENT 20.7 FEET NORTH 20' EAST FROM 36" FIR STUMP. 10 FOOT WEST OF "I" OF DIRT ROAD.
#6071 1" IRON PIPE CAPPED LS 19642 5.4 FEET SOUTH 50' EAST FROM 15" FIR WITH NOTCHES, AND 7.5 FEET EAST FROM 9" FIR WITH NOTCHES.
#6072 1" IRON PIPE WITH NAIL SOUTHEAST SIDE 10' STEEL POST 26.2 FEET SOUTH 2' EAST FROM 36" CEDAR, 19.3 FEET SOUTH 35' EAST FROM 18" ALDER.
#6073 1" IRON PIPE 23.0 FEET SOUTH FROM 22" FIR, 14.7 FEET SOUTH 10' WEST FROM 15" MAPLE, 9.0 FEET NORTH 10' EAST FROM 15" MAPLE.
#6077 2.5" PIPE WITH BRASS CAP UP 0.8' STAMPED HANSEN LS 27134 1/4 COR SEC 13, 18 R3W, R2W, T18N, 21.3 FEET NORTH 54' WEST FROM CENTER OF 24" STUMP, 24.3 FEET SOUTH 30' EAST FROM FACE 24" CEDAR WITH LS27134 TAG, 24.8 FEET NORTH 70' EAST FROM FACE 18" FIR WITH LS 27134 TAG.
#6085 1" IRON PIPE CAPPED LS 19642 2.3 FEET SOUTH 65' EAST FROM 6" FIR, 7.7 FEET NORTH FROM 12" FIR, 5.0 FEET SOUTH 25' EAST FROM 10" FIR.
#6097 THURSTON COUNTY MONUMENT #272.
#6098 THURSTON COUNTY MONUMENT #403.
#6099 THURSTON COUNTY MONUMENT #406.

* NOTE:
SCRIBING PLACED ON STANDARD U.S.F.W.S.
3 1/4" ALUMINUM CAPS SET ON 24"
#5 REBAR.



AUDITOR'S CERTIFICATE
Filed for record this 7 day of Aug, 2020 at 12:00
P.M. in book of Surveys at page 1 of 1
request of U.S. Fish and Wildlife
Auditor's Fee No. 3306782
Gunnith Thurston Sams Reed
Deputy County Auditor

SURVEYOR'S CERTIFICATE
This map correctly represents a survey made by me or under my direction in conformance with the requirements, of the Survey Recording Act at the request of
U. S. FISH and WILDLIFE in 8/02, 2000.
Marth P. Roy Certification #35981

HUIT-ZOLLARS
Land Planning Civil Engineering Landscape Architecture
Surveying Environmental Services
302 South 9th Street/ Suite 101 / Tacoma, WA 98402
Phone (253)627-9131 Fax (253)627-4730
www.huit-zollars.com
checked
drafted M.P.R. job no. 15-0327-01
date 7-18-2000 DWG# X327SRS.DWG
scale 1" = 500'

Index Data - NE1/4 & SE1/4 OF SEC.24
SET 1/4 OF SEC.13
TOWNSHIP 17 NORTH, RANGE 3 WEST
RECORD OF SURVEY
FOR
U. S. FISH and WILDLIFE
THURSTON COUNTY, WASHINGTON.
SHT 1 OF 2

SUR # 3306782 1/2

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
DIVISION OF REALTY

TRACT DESCRIPTION
OF THE
DAVID E. LAPP, et ux, TRACTS
(26, R, R1)
THURSTON COUNTY, WASHINGTON
BLACK RIVER UNIT
NISQUALLY NATIONAL WILDLIFE REFUGE
CONTAINING 59.32 ACRES

DESCRIPTION PREPARED BY
Martin P. Roy, PLS
Project Land Surveyor
Huitt-Zollars, Inc.
June 23, 2000

DESCRIPTION
OF THE
DAVID E. LAPP, et ux, TRACTS
(26, R, R1)
THURSTON COUNTY, WASHINGTON.

The following described tract of land is located in Thurston County, Washington, situate approximately 2.5 miles north-northeast of Littlerock, Washington, and being all of the Lands described in the Statutory Warranty Deed from Donald W. Huston and Donna M. Huston to David Lapp and Michele Lapp recorded January 29, 1993 under Auditor File Number 9301290167, and a portion of Quit Claim Deed from Agnes W. Huston to Donald W. Huston and Donna Huston recorded December 6, 1968 under Auditors File Number 792697, Records of Thurston County, Washington; said tract more particularly described as follows;

All bearing and distances are based on the Washington State Plane Coordinate System , NAD 88-91, South Zone; divide distances by 0.999929 for ground distances.

TOWNSHIP 17 NORTH, RANGE 3 WEST, WILLAMETTE MERIDIAN:

TRACT (26)

All those portions of the Northeast Quarter of the Northeast Quarter of Section 24, and those portions of the Southeast Quarter of the Southeast Quarter, and the Southeast Half of the Northeast Quarter of the Southeast Quarter of Section 13, lying Westerly of the following described line: Commencing at the Southwest Corner of the Northeast Quarter of the Northeast Quarter of said Section 24;

thence along the south line of said Northeast Quarter of the Northeast Quarter, South 82°34'07" East, 407.80 feet to a set USFWS aluminum cap and rebar, marked "6011, TR. 26, PLS 35981 2000", and the Point of Beginning of said line;

thence North 16°24'17" East, 1331.61 feet to the north line of the Northeast Quarter of the Northeast Quarter of Said Section 24;

thence continuing North 16°24'17" East, 245.46 feet to a set USFWS aluminum cap and rebar, marked "6004, TR. 26, PLS 35981 2000";

thence North 18°07'42" East, 1151.30 feet to a set USFWS aluminum cap and rebar, marked "6005, TR. 26, PLS 35981 2000";

thence North 01°58'55" East, 1003.40 feet to a set USFWS aluminum cap and rebar, marked "6012, TR. 26, PLS 35981 2000", on the northwest line of the Southeast Half of the Northeast Quarter of the Southeast Quarter of Section 13, said cap lying South 51°46'40" West, 361.31 feet from the East Quarter Corner of said Section 13, and the terminus of said line.

TRACT (26R)

A strip of land in the Southwest Quarter of Section 19, Township 17 North, Range 2 west, and in the Southeast Quarter of Section 24, Township 17 North, Range 3 west, Willamette Meridian, Thurston county, Washington, said strip of land being 30.00 feet wide and lying 15.00 feet on each side of the following described centerline:

Commencing at the Southeast corner of Section 24, Township 17 North, Range 3 West, Willamette Meridian; thence along the east line of the Southeast Quarter of said Section North 01°57'17" East, 454.42 feet to the center of an existing access road and point "A", and the beginning of said easement; thence following the centerline of said existing access road South 66°29'21" West, 67.28 feet; thence South 84°28'45" West, 23.90 feet; thence North 83°22'03" West, 54.40 feet; thence North 70°26'27" West, 43.46 feet; thence North 66°55'28" West, 50.48 feet; thence North 63°13'01" West, 91.98 feet; thence North 65°01'24" West, 65.62 feet; thence North 70°19'48" West, 100.25 feet; thence North 74°15'36" West, 106.15 feet; thence North 70°50'16" West, 76.09 feet; thence North 64°51'17" West, 73.24 feet; thence North 56°12'45" West, 36.44 feet; thence North 51°00'40" West, 27.69 feet; thence North 46°02'13" West, 30.21 feet; thence North 42°24'44" West, 49.37 feet; thence North 35°00'28" West, 140.98 feet; thence North 29°41'05" West, 126.62 feet; thence North 26°33'16" West, 187.27 feet; thence North 25°43'54" West, 157.61 feet; thence North 24°52'07" West, 200.03 feet; thence North 23°45'18" West, 102.33 feet; thence North 21°07'58" West, 96.95 feet; thence North 15°30'56" West, 50.64 feet; thence North 11°37'09" West, 32.88 feet; thence North 07°18'43" West, 35.87 feet; thence North 01°28'47" East, 365.83 feet; thence North 03°35'38" East, 56.13 feet; thence North 02°27'31" East, 159.77 feet; thence North 21°55'28" West, 49.85 feet to the West line of the Northeast Quarter of the Southeast Quarter of said Section 24, said point being South 1°28'47" West, 409.19 feet from a 1" iron pipe tagged "Ls 19642 Soloman" marking the center east sixteenth of said Section, and the western terminus of said centerline;

Thence continuing said easement from aforementioned point "A" on the centerline of an existing access road, following the centerline of said existing access road; North 55°09'30" East, 391.66 feet; thence North 53°33'22" East, 247.06 feet; thence North 63°35'21" East, 51.85 feet; thence North 71°56'45" East, 49.69 feet; thence North 80°47'18" East, 60.70 feet; thence North 88°09'21" East, 71.52 feet; thence South 87°54'15" East, 241.31 feet; thence South 82°56'24" East, 90.22 feet; thence North 88°09'57" East, 96.14 feet thence South 80°41'57" East, 91.89 feet more or less to the centerline of Littlerock road, and the eastern terminus of said centerline.

Excluding therefrom any portion lying within the existing right-of-way of Littlerock road

The sidelines of said strip shall be prolonged or shorten to terminate at the same endlines as the centerline.

TRACT (26R1)

A strip of land in the Southeast Quarter of the Northeast Quarter of Section 24, Township 17 North, Range 3 West, Willamette Meridian, Thurston County, Washington, said strip of land being 30.00 feet wide and lying 15.00 feet on each side of the following described centerline:

Beginning on the West line of the Southeast Quarter of the Northeast Quarter of said Section 24 North $01^{\circ}31'49''$ East, 679.81 feet from a 1" iron pipe tagged "Ls 19642 Soloman" marking the center East sixteenth of said Section as measured along said West line; thence along an existing dirt road North $19^{\circ}12'25''$ East, 63.15 feet; thence North $16^{\circ}28'10''$ East, 102.78 feet; thence North $13^{\circ}21'26''$ East, 83.12 feet; thence North $08^{\circ}48'42''$ East, 82.06 feet; thence North $01^{\circ}40'27''$ West, 96.23 feet; thence North $00^{\circ}24'44''$ West, 99.76 feet; thence North $20^{\circ}23'59''$ East, 102.91 feet; thence North $29^{\circ}31'41''$ East, 19.46 feet to the north line of the Southeast Quarter of the Northeast Quarter of said Section 24, and the terminus of said centerline, said terminus lying North $82^{\circ}34'07''$ west 300.46 feet from a USFWS aluminum cap and rebar, marked "6011 Tr. 26, PLS 35981 2000".

The sidelines of said strip shall be prolonged or shorten to terminate at the same endlines as the centerline.

The above described Tract of land, containing 59.32 acres, more or less, is delineated on a map tracing designated DAVID E. LAPP, et ux, TRACTS (26, R, R1) bearing the date of June 19, 2000, of record in the files of the Department of the Interior. A print from that map tracing is attached hereto.

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
DIVISION OF REALTY

STATE OF WASHINGTON)
) ss
COUNTY OF THURSTON)

I hereby certify that the attached map of the David E. Lapp, et ux, Tracts (26, R, R1) has been correctly platted from official plats and other data obtained from the files of the Department of Natural Resources, the Bureau of Land Management, Department of the Interior, and from notes and other data obtained from field surveys by Huitt-Zollars; that the Section and lot lines and other subdivision lines, as here shown, have been placed upon said map after careful consideration of all available data on the subject; and that all said data, as shown upon the attached map, have been checked by me and are correct to the best of my knowledge and belief.

Martin P. Roy, PLS
Project Land Surveyor
Huitt-Zollars, Inc.
June 23, 2000

Date: June 23, 2000

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
DIVISION OF REALTY

CERTIFICATE OF OCCUPANCY
BLACK RIVER UNIT, NISQUALLY NATIONAL WILDLIFE REFUGE
THURSTON COUNTY, WASHINGTON

I hereby certify that on June 2nd, 2000, Martin P. Roy, Professional Land Surveyor, made a personal inspection of the DAVID E. LAPP, et ux, TRACTS (26, R, R1) as shown on the attached map, and found evidence of present or past occupancy and use as indicated below:

TRACT (26)

- 1.) Portions of the tract of land is currently being used as a gravel pits.
- 2.) The tract contains access roads and is accessed by both paved and gravel roads .
- 3.) The tract is adjacent to power lines on the east side, and adjacent to the Black River Basin on the west side.

Portions of tract has small timber, however, the majority of the tract appears to have been logged within the last ten years.

TRACT (26R)

- 5.) Paved road from Littlerock Road toward the west for the first 2600 linear feet, it then continues as a gravel road to its terminus.

TRACT (26R1)

- 6.) Dirt / gravel road from the beginning to its terminus.

Martin P. Roy, PLS
Project Land Surveyor
Huitt-Zollars, Inc.
June 23, 2000

Date: June 23, 2000

Public Land Survey System Legal Descriptions

This format is recommended, and it's required for descriptions of land that we will publish in the Federal Register, for example, Public Land Orders, and Executive Orders. See "Specifications for Descriptions of Tracts of Land for Use in Land Orders and Proclamations," U.S. Department of the Interior, 1979 edition or later, if replaced. *Note:* some institutions do not allow abbreviations as shown below and require that you spell out all words.

THE PREFERRED ORDER OF LISTING DESCRIPTIONS

If more than one township is included, the preferred numerical order of listing is to begin with the lowest range number, and, within each range, by the township numbers, also beginning with the lowest.

Where townships east and west of the principal meridian or north and south of the base line, or both, are involved, the preferred order of listing is: first those north and east of the initial point, followed by those north and west, south and west, and south and east in the order named. Describe all the parts of each township and range before proceeding to the next township and range.

The preferred order of listing sections is to begin with the lowest-numbered section in each township, giving first the lot numbers in order, then the subdivisions within each quarter section, in the order NE, NW, SW, and SE. If describing parts of the quarter-sections, observe the same order, and describe all the parts of each quarter-section before proceeding to the next quarter-section, and so on. Tracts should follow the sections because a tract is part of a township, as is a section, and is numbered the same as a section, beginning with 37 or the next highest unused numerical designation to avoid confusion with section numbers. List tracts before non-rectangular surveys, e.g., mineral survey, donation, land claim.

THE PREFERRED METHOD FOR WRITING DESCRIPTIONS

A proper aliquot description should contain all of the reference elements within it: Principal Meridian, State, township and range, section, and lots or aliquot parts.

Example: Assume it is section 27, Township 20 North, Range 20 East, Mount Diablo Meridian, Nevada. The proper aliquot description should contain all of the reference elements within it.

Mount Diablo Meridian, Nevada
T. 20 N., R. 20 E.,
sec. 27, NW $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$, and SE $\frac{1}{4}$ SE $\frac{1}{4}$.
The area described contains 210 acres.

The use of a comma is significant in writing the descriptions of the subdivisions of a section. A comma means "AND THE" and the absence of a comma means "OF THE." The improper use or placement of a comma could drastically change an aliquot description and the intended acreage described. The description NE $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ absent the comma describes an aliquot part of 10 acres. With a comma, NE $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$ describes three aliquot parts totaling 480 acres. The following example demonstrates the proper use of the comma in an aliquot description: The NW $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$, describes three aliquot parts containing 210 acres.

In using symbols, the usual punctuation is omitted in the aliquot part portion of the description. Note that the period is omitted after N, NE, S, SE, etc., within the aliquot parts description, and that there is no comma and no space between symbols that indicate a quarter-quarter section (NE $\frac{1}{4}$ SE $\frac{1}{4}$). The usual punctuation is included in the portion of the land description where township and range are abbreviated (T. 20 N., R. 20 E.).

You may combine some contiguous units. For example, if section 10, NW1/4 and section 10, SW1/4 is included, you can designate the resulting 320-acre unit as "sec. 10, W1/2". Where section 22, NE1/4NW1/4 and SE1/4NW1/4 is included, you can designate the resulting 80-acre unit as "sec. 22, E1/2NW1/4". And where section 22, NE1/4NW1/4, NW1/4NW1/4, and SE1/4NW1/4 is included, you can designate the unit as "sec. 22, N1/2NW1/4 and SE1/4NW1/4". The combination must follow the preferred order of listing. When the entire section is included, whether containing lots or not, you can designate the whole section (sec. 6).

One half of a regular section consists of two quarter sections having a common boundary, and the section divided by a line between opposite quarter section corners. Do not use half of a half description as it could cause ambiguity as to the intended location of the division line. For example, if section 10, W1/2NW1/4 and W1/2SW1/4 are included, do not use the symbol "sec. 10, W1/2W1/2" because it is ambiguous and subject to more than one interpretation.

For half of a half description of acquired lands, the prevailing rule does vary from State to State as to whether the presumption is to describe half by area or half by government measurement. Do not use half of half descriptions, or be very careful if you do use them. If there is doubt as to the location of the division line, you must provide further explanation of the intent.

The sections along the north tier and west range of a regular township are typically irregular sections and contain lots. These lots are a legal subdivision of a section and designated by section and lot numbers, such as "sec. 3, lot 1". Lots cannot be described as aliquot.

The words "township" and "range" and the designations "north" or "south," "east" or "west" are sometimes written in full when used in the text, but the land description itself should be in tabular form and these terms abbreviated and capitalized where appropriate. The principal abbreviations are as follows:

Township(s)	T. or Tps.
Range(s)	R. or Rs.
Section(s)	sec. or secs.
North	N.
Northeast	NE

When grouping two or more township units in the description, always use the plural abbreviation "Tps." and/or "Rs.", even though all the townships have the same number east or west of the principal meridian or north or south of the base line. Abbreviate the term "township" and "range" in the singular or plural as the meaning may require, for example:

- T. 13 N., R. 11 E. (1 township)
- Tps. 4 and 5 N., R. 14 W. (2 townships)
- Tps. 3 S., Rs. 16 and 17 W. (2 townships)
- Tps. 1 thru 4 S., Rs. 6 thru 9 E. (16 townships)

EXAMPLES OF DESCRIPTIONS OF LANDS BASED ON THE RECTANGULAR SURVEYS OF THE PUBLIC LAND SURVEY SYSTEM

Single Section

Example No. 1

Fourth Principal Meridian, Wisconsin

T. 31 N., R. 18 W.,

sec. 9, SE1/4.

The area described contains 160 acres.

Multiple Sections

Example No. 2

Fifth Principal Meridian, North Dakota

T. 160 N., R. 66 W.,

sec. 6, lots 4 thru 7, SE1/4NW1/4, and E1/2SW1/4, M.S. 800;

sec. 7, lots 1 thru 4, E1/2NW1/4, and E1/2SW1/4, H.E.S. 63;

sec. 17, W1/2SW1/4;

sec. 18, NE1/4;

sec. 20, W1/2NW1/4 and SW1/4.

The areas described aggregate 1,090.18 acres.

Multiple Sections and Townships**Example No. 3**

Black Hills Meridian, South Dakota

T. 3 S., R. 1 E.,

sec. 6;

sec. 8, SE1/4;

sec. 21;

sec. 28, E1/2, N1/2NW1/4, SE1/4NW1/4, and NE1/4SW1/4;

sec. 31, lots 2 and 4, NW1/4NE1/4, NE1/4NW1/4, and SE1/4;

sec. 34, W1/2NE1/4, W1/2, W1/2SE1/4, and W1/2SE1/4SE1/4.

T. 5 S., R. 2 E.,

sec. 17, N1/2, excepting SDM 43307;

sec. 22, N1/2, reserving SDM 43308;

sec. 34, N1/2, subject to SDM 43309.

T. 5 S., R. 3 E.

T. 6 S., R. 3 E.,

sec. 4, lots 1, 2, 3, 7, and 8, SW1/4NE1/4, S1/2NW1/4, and SE1/4;

sec. 15 and secs. 17 and 18.

The areas described, including both Federal and non-Federal lands, aggregate 28,184.79 acres.

Example No. 4

Salt Lake Meridian, Utah

T. 39 S., R. 10 W.,

sec. 31, lots 4 thru 14 and lots 19 thru 30.

T. 40 S., R. 10 1/2 W.,

sec. 1, that portion lying southerly of the southerly right-of-way boundary of UTU 43433;

sec. 2, unsurveyed.

T. 38 S., R. 11 W.,

secs. 31, 32, and 33, those portions lying northerly and easterly of the centerline of U.S. Highway 93.

T. 39 S., R. 11 W.,

secs. 4 thru 9 and secs. 16 thru 21, partly unsurveyed;

sec. 24, NE1/4 and S1/2;

secs. 25 thru 29 and secs. 33 thru 36.

T. 40 S., R. 11 W.,

secs. 2, 3, 4, 9, 10, 15, 16, 21, 22, 27, 28, 33, and 34.

T. 41 S., R. 11 W.,

sec. 4;

sec. 5, lots 1 and 2, S1/2NE1/4, and SE1/4;

sec. 8, NE1/4;

secs. 9, 16, and 21.

T. 38 S., R. 12 W.,

sec. 10, N1/2 and SW1/4;

sec. 11, W1/2 and SE1/4;

sec. 12, N1/2 and SE1/4;

sec. 13, NE1/4 and S1/2;

sec. 21, E1/2;

secs. 22, 23, and 24;
 sec. 29, lot 1 and lots 3 thru 8;
 secs. 33 thru 36.
 T. 39 S., R. 12 W.,
 secs. 1 thru 4 and secs. 9 thru 15, partly unsurveyed;
 sec. 16, E1/2;
 secs. 22, 23, and 24, partly unsurveyed.

Example No. 5

Mount Diablo Meridian, California

T. 45 N., R. 21 E.,
 secs. 1, 2, 4, 6, and secs. 8 thru 17.
 T. 46 N., R. 21 E.,
 secs. 20 thru 29;
 sec. 30, E1/2NE1/4 and E1/2SE1/4;
 sec. 31, W1/2NW1/4SE1/4 and W1/2SW1/4SE1/4;
 secs. 32 thru 36.
 T. 46 N., R. 22 E.,
 secs. 4 thru 9, secs. 11 thru 14, and secs. 16 thru 21, partly unsurveyed.
 T. 45 N., R. 23 E.,
 sec. 8, W1/2SE1/4;
 sec. 10, N1/2NE1/4 and SW1/4NE1/4;
 sec. 11, W1/2NW1/4 and SE1/4NW1/4;
 sec. 12, N1/2SW1/4 and SE1/4SW1/4;
 sec. 13, NE1/4SE1/4 and S1/2SE1/4;
 sec. 20, W1/2NE1/4, unsurveyed;
 sec. 28, W1/2SW1/4;
 secs. 29 thru 32.

Example No. 6

Principal Meridian, Montana

Tps. 1, 2, and 3 N., R. 1 E., unsurveyed.
 Tps. 1 thru 4 N., Rs. 2 and 3 W., partly unsurveyed.
 T. 1 S., R. 18 W.,
 secs. 1 thru 18.
 Tps. 1 S., Rs. 19 and 20 W., partly unsurveyed.
 T. 1 S., R. 19 E.,
 sec. 33, lots 1, 2, and 4, and lots 6 thru 9;
 sec. 34, that part lying northwesterly of the medial line, an ambulatory line, of Snake Creek;
 tracts 43, 44, 46, and tracts 48 thru 53.

Example No. 7

Sixth Principal Meridian, Wyoming

T. 37 N., R. 67 W.,
 secs. 4 thru 9, secs. 16 thru 21, and secs. 28 thru 33.
 T. 38 N., R. 67 W.,
 secs. 4 thru 9, secs. 16 thru 21, and secs. 28 thru 33.
 T. 39 N., R. 67 W.,
 secs. 1 thru 24, and secs. 28 thru 33.
 Tps. 40, 41, and 42 N., R. 67 W.
 Tps. 37 thru 40 N., R. 68 W.
 Tps. 38 N., Rs. 69, 70, and 71 W.
 Tps. 39 N., Rs. 70 thru 73 W.
 T. 44 N., R. 70 W.,
 secs. 1, 2, and 3, secs. 10 thru 13, secs. 22 thru 27, and secs. 34, 35, and 36.

Example No. 8

Gila and Salt River Meridian, Arizona

T. 23 N., R. 32 W.,

sec. 4;

tract 37.

T. 23 N., R. 33 W.,

sec 9;

tract 46;

M.S. No. 3202.

Tps. 23 N., Rs. 34 and 35 W.,

tract 57;

M.S. No. 246.

The areas described aggregate 3,233.86 acres.

Lot and Block Legal Description

For a description in the Lot and Block system to be legal, it must identify:

1. The individual lot,
2. The block in which the lot is located, if applicable,
3. A reference to a platted subdivision or a phase of the subdivision,
4. A reference to find the cited plat map (i.e., a page and/or volume number), and
5. A description of the map's place of official recording (e.g., recorded in the files of the County Engineer).

Example:

Lot ? of Block ? of the ? Subdivision plat as recorded in *Subdivisions, Book, Page, File, County, State*.

or:

Lots 6 and 7, Block 20, Old Survey Subdivision, Leesville, Vernon Parish, Louisiana, according to the plat thereof filed in Book "K" of Subdivisions at Page 22 in the records of the Clerk of said Parish.

UNITED STATES
DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
REGION 3
DIVISION OF REALTY

MARCH 30, 2014

PROJECT INSTRUCTIONS

TRACT 10e,

SENEY NATIONAL WILDLIFE REFUGE, MICHIGAN

These project instructions provide for the dependent resurvey of a portion of the East boundary, a portion of the subdivisional lines and the Metes-and-Bounds Survey of Tract No. 10e, of Township 52 North, Range 27 West, Michigan P.M. Schoolcraft County, Michigan.

In the execution of the surveys included under these instructions, the land surveyor assigned is authorized and directed to make the necessary retracement, resurveys, and surveys set out in these instructions and will be guided by the Service Manual, Cadastral Surveys and Maps, Part 343, chapters 1 and 2, and the Bureau of Land Management *Manual of Surveying Instructions, 2009* (BLM Manual), the following project instructions, and such additional and supplemental instructions as may be issued during the progress of the work.

AUTHORITY

The survey was requested by the Refuge Manager, Seney NWR, by memorandum dated September 11, 2008, and is authorized under Departmental Manual, 142 DM 3, subsection B, Division of Realty, and the Migratory Bird Conservation Act, February 23, 1929.

APPROPRIATION

The costs of the field and office work incurred in the execution of the surveys in these instructions are payable from funds made available by the Seney NWR.

LIMIT AND CHARACTER OF WORK

The field work described in these instructions will be limited to the retracement, dependent resurvey, and survey of T. 52 N., R. 27 W., Michigan Meridian, Michigan, to the extent necessary to delineate and monument Tract 10e, located in section 25, Seney NWR.

HISTORY OF FORMER SURVEYS

The south boundary was surveyed by Deputy Surveyors J.H. Hudson and A.G. Fordham in 1863 under Contract No. 44.

The east boundary, a portion of the north boundary, and a portion of the subdivisional lines were surveyed by Deputy Surveyors J.H Hudson in 1865 under Contract No. 48.

The west boundary, a portion of the north boundary, and a portion of the subdivisional lines were surveyed by W.N. Michigan in 1867 under Contract No. 53.

Tract No. 10c was surveyed by Gary Kratz, Land Surveyor, in 1998 and is on record at the Region 3 Regional Office.

The history of other former surveys remote to the area of this survey are omitted.

METHOD AND ORDER OF PROCEDURE

Dependently resurvey the east boundary of the township to the extent necessary to determine the eastern boundary of section 25.

Dependently resurvey a portion of the subdivisional lines and subdivide section 25, to the extent necessary to determine the boundaries of the NE1/4 of section 25.

Survey by metes and bounds the centerline of US Highway (98) from its intersection with the east-west center line of section 25; northwesterly to the intersection with the north-south center line of section 25.

Survey by metes and bounds the boundaries of Tract 10e as shown on the attachment A.

Monuments will be established at the intersections of the metes-and-bounds surveys lines with the centerline of the Highway, section lines and surveyed subdivision-of-section lines.

The resurvey and retracement of additional lines for proper closure and necessary control is authorized, as is the monumentation of intermediate corners controlling Federal lands, providing such monumentation can be accomplished without additional retracement.

Local survey data pertinent to this area will be obtained and evaluated by the land surveyor during the course of the field work. Ties will be made to all corners recovered, whether accepted or rejected, as well as all springs and other topographic features and improvements on federally-administered lands. All non-Federal surveys or evidence of survey will be carefully substantiated and verified to determine proper placement using commonly recognized Service survey methods and procedures.

Certain lands, both public and private, are sensitive to human influence and as such have

regulations and restrictions governing entry and use. Before beginning any field work, the land surveyor will review land ownership and contact the appropriate party(s) for any regulations and restrictions that may apply to those lands.

Should the land surveyor encounter any regulations or restrictions that may counter these project instructions, hamper production, or prevent the completion of this survey, he/she/they should immediately contact this office for further guidance.

The maximum limit of closure for the surveys in this group will be 1:5000 for latitude, and departure considered separately. When closing upon earlier brass cap surveys, the closures of areas containing Federal land must meet Service Manual requirements in effect at the time of the earlier work.

MONUMENTATION

All corners will be monumented with regulation posts, marked according to the Service Manual, except in cases where another material is deemed more practical, permanent, or prominent. A plastic-encased magnet must be placed at the base of each monument as a memorial. Accepted local corners will be remonumented unless the local monument is determined to be as substantial and durable as a regulation post. Reference monuments, witness points, and witness corners may be set where required.

GEODETIC CONTROL

The geographic position for the surveys under this group will be determined by using survey grade global positioning system receivers, or by closed traverse ties to stations of the National Geodetic Reference System.

FIELD NOTES, PLATS AND REPORTS

During the course of the field work, the party chief should pay special attention to make certain the survey records are kept current and are complete in every detail before leaving the field. Field notes will be prepared that contain a complete technical record of all data pertaining to the survey, including the precise course and length of all lines, ties to topographic features, and improvements on Federal interest lands, together with a complete description of all corners recovered, whether accepted or rejected, and the new monument set. A draft plat will be submitted to this office in a digital format along with all sketch plats, field books, and other survey records.

MODIFICATION OF INSTRUCTIONS

Should something happen that might require additional instructions or make these instructions inapplicable as prepared, the party chief will immediately submit a written report of the situation with appropriate recommendations for consideration by this office.

ACCOMPANYING DATA

Accompanying these instructions are:

1. Copies of plats and field notes of previous surveys.
2. Copy of FWS Form 3-XXX, Survey Request,
3. Attachment A, Legal Description Tract No. 10e.

APPROVED: _____ MONTH, DAY, Year
Regional Land Surveyor

EXAMPLE

Region 3
Division of Realty
100 Federal Drive
Fort Snelling, Minnesota, 55111

IN REPLY REFER TO

SENEY NWR
TRACT 11
MICHIGAN

March 31, 2014

Memorandum

To: Robert Nicolli, Senior Land Surveyor
From: Gary Kratz, Regional Land Surveyor, Region 3
Subject: Survey of Tract 10e, Seney NWR

Under authority of these instructions, you are assigned to the survey of Tract 10e, NW1/4NW1/4 of section 25, Township 52 North, Range 27 West, Michigan P.M., Luce County, Michigan. You must follow the enclosed project instructions during the course of your field work.

All field costs relative to this project will be coded to the Seney NWR.

Cc: Refuge Manager, Seney NWR

Survey Point Identification

PLSS Rectangular and Non-Rectangular Corner Identification

The following diagram illustrates the point ID (PID) scheme used to identify the section corners of a standard township:

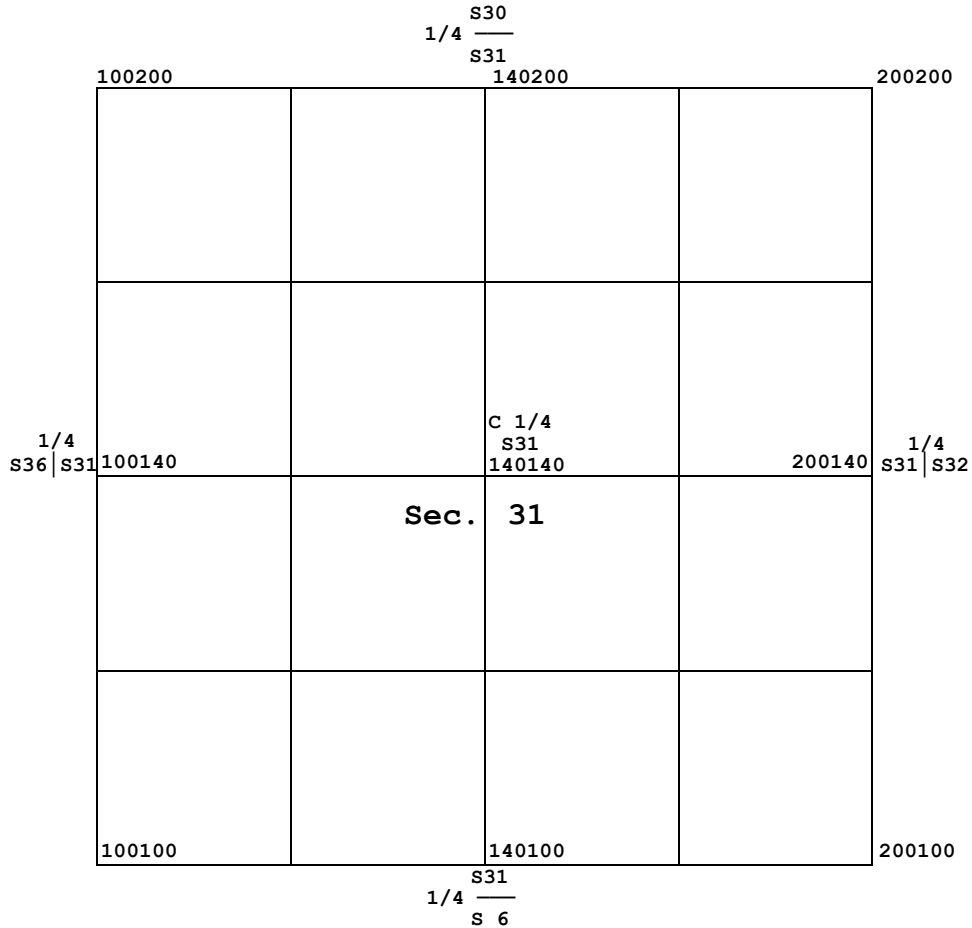
100700	200700	300700	400700	500700	600700	700700
Sec. 6	5	4	3	2	Sec. 1	
100600	200600	300600	400600	500600	600600	700600
7	8	9	10	11	12	
100500	200500	300500	400500	500500	600500	700500
18	17	16	15	14	13	
100400	200400	300400	400400	500400	600400	700400
19	20	21	22	23	24	
100300	200300	300300	400300	500300	600300	700300
30	29	28	27	26	25	
100200	200200	300200	400200	500200	600200	700200
Sec. 31	32	33	34	35	Sec. 36	
100100	200100	300100	400100	500100	600100	700100

The user will note that a grid of 7 north-south and 7 east-west lines has been constructed. The *prefixes* of the north-south lines begin with the number 100, on the westernmost line, beginning with Section 31, and increase in 100 unit increments as the lines proceed easterly, to the easternmost line, which is identified by the prefix of 700, on the east boundary of Section 36.

The 7 east-west lines begin with a *suffix* of 100, at the southernmost line in the township, beginning with Sections 31-36, and increase in 100 unit increments, to the northernmost line, which is identified by the suffix of 700, in Sections 1-6.

One-Quarter Section Corner Identification

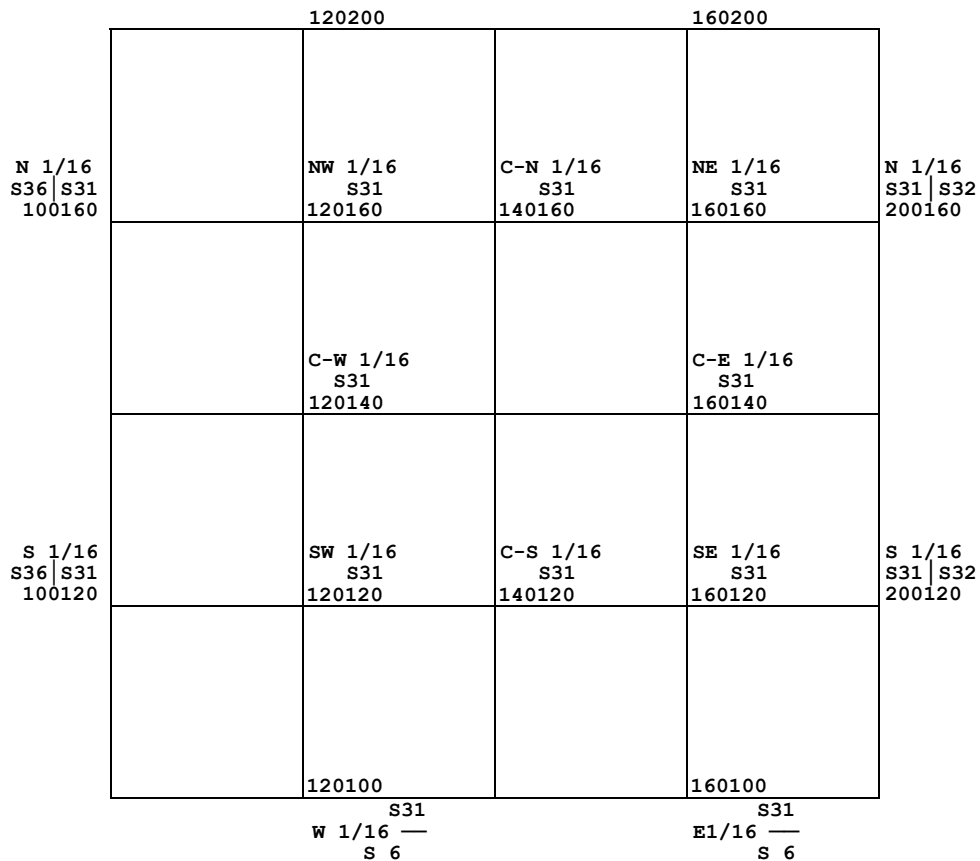
The previous set of point IDs is used to define the four corners of specific sections within a township, but a further dissection is necessary if PLSS corners are to be identified which were created in the subdivision of sections. The following diagram illustrates the point ID scheme used to identify 1/4 section corners created in the subdivision of a standard section. Section 31 will be used to demonstrate this strategy:



The user will notice that the four 1/4 section corners of section 31 are located at midpoint between respective section corners, and that the 1/4 section corners that fall on the east-west lines are identified with the **prefix** 140yyy, while the north-south lines have 1/4 section corners are identified by a **suffix** of xxx140.

One-Sixteenth Section Corner Identification

The following diagram of Section 31 illustrates the point ID scheme used to further identify 1/16 section corners created in the subdivision of a standard section.



This next division identifies 1/16 section corners, which are located at midpoint between respective 1/4 section corners. Notice that the south 1/16 section corner, on the west boundary of Section 31 is identified with the **suffix** of xxx120. A standard section will identify eight exterior 1/16 section corners, and eight interior 1/16 section corners as illustrated. Further subdivision of sections is possible that identifies subdivisional corners subdivided below 1/16 section corners, using this same strategy for point identification.

Non-Rectangular Surveys

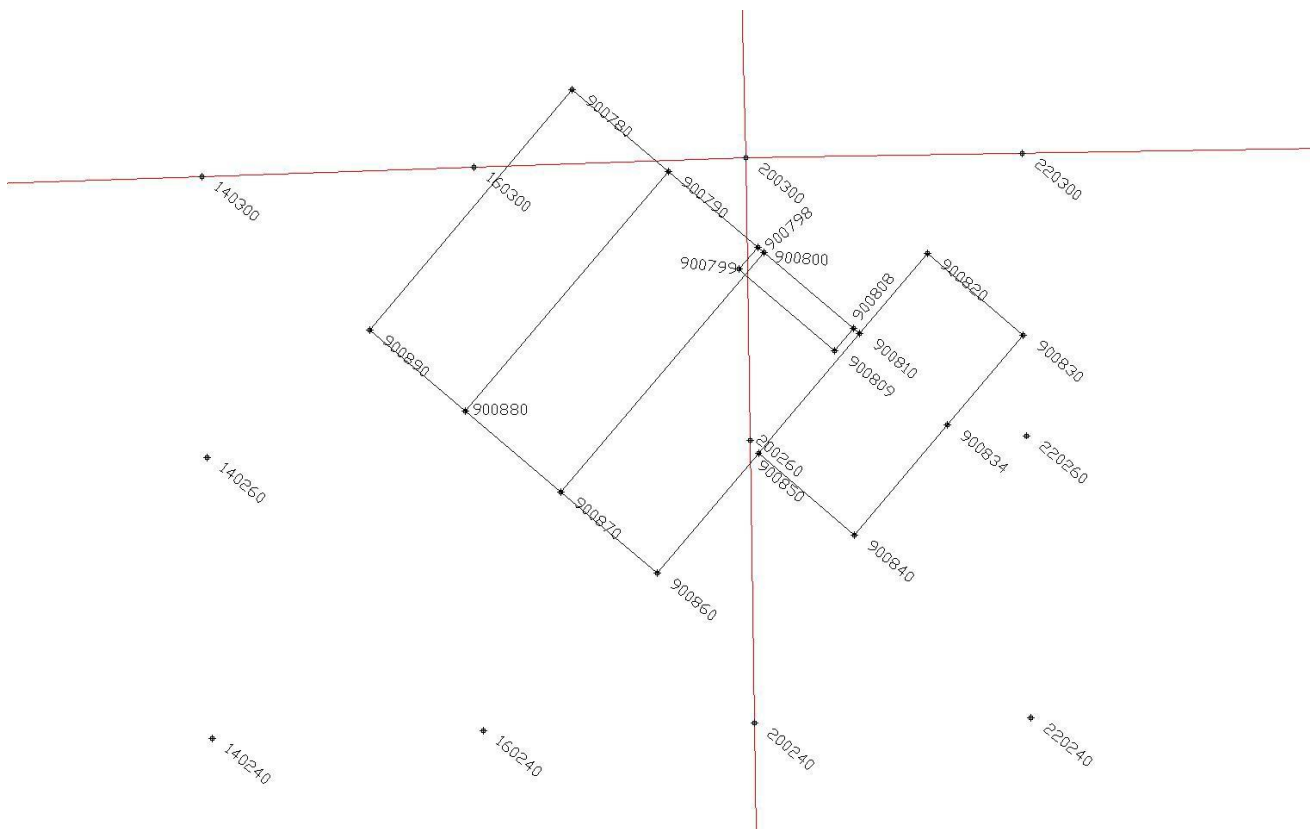
Non-rectangular surveys include meanders, small holding claims, grant boundaries, reservation boundaries, mineral surveys, homestead entry surveys, tracts, etc. These non-rectangular surveys have been broken down into four categories:

1. Boundaries with Mileposts
2. Meanders
3. Tracts
4. Mineral Surveys, Homestead Entry Surveys (HES), etc.

The following list identifies point ID prefixes used to describe these non-rectangular surveys:

1. 711-799 - Boundaries with Mileposts
2. 800-836 - Meanders
3. 837-899 - Tracts
4. 900-999 - Mineral Surveys, Homestead Entry Surveys, etc.

An example of Mineral Survey Point ID's:



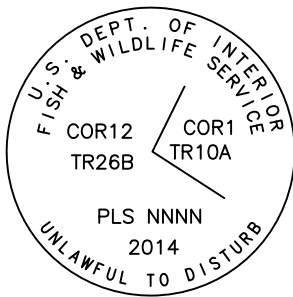
Monument Markings on Non-Rectangular Surveys

1. Use lines to signify the direction of the boundary lines extending from the monument. Use the "I" stamp or chisel to make the dashes. Stamp the lines before any other stamping.
2. Always place the year date stamp (2014) on the southernmost portion of the cap.
3. For the tract being monumented, the corner number is stamped on the cap as "COR ####", where "####" is the actual corner number. The tract number is stamped as "TR ###Z", where "####" is the actual tract number and "Z" is replaced by appropriate tract letter, if applicable. For example, Tract (567a) is stamped as TR 567A; Tract 567 is stamped TR 567. These marks are stamped within the tract boundary.
4. If the surveyed tract abuts other Service tracts, also stamp the abutting tract numbers in the appropriate places on the cap.

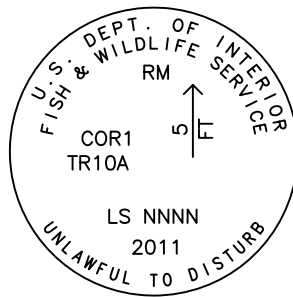
EXHIBIT 11b

Agency inscription is pre-stamped. Cap stamping is done with 0.08” metal dies. Cap is oriented to be read facing north. Cap is always centered on the true corner point. Stamping begins with center punch, then the guide lines are stamped using the letter "I" and stamping proceeds outward from the center.

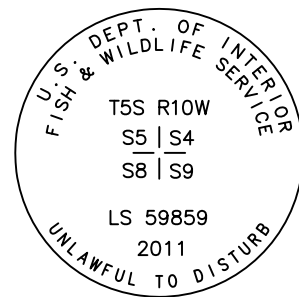
Typical stamping for metes and bounds corner point.



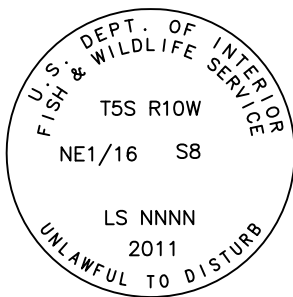
Reference Monument for the same corner. Arrow points to the True corner position. Note the even-foot offset



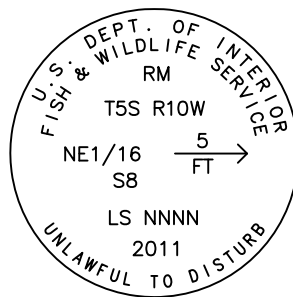
Section Corner. PLSS corners are stamped per the BLM Manual of Instructions, with the addition of the Township designation.



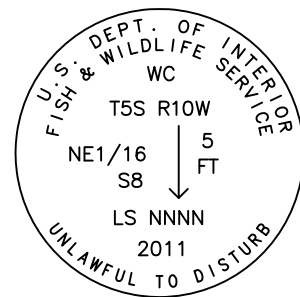
One-sixteenth corner. See BLM Manual for other minor subdivision corner marks.



Reference monument for the same corner. Arrow points to true corner point.



Witness Corner monument for same corner. Arrow points to true corner point.



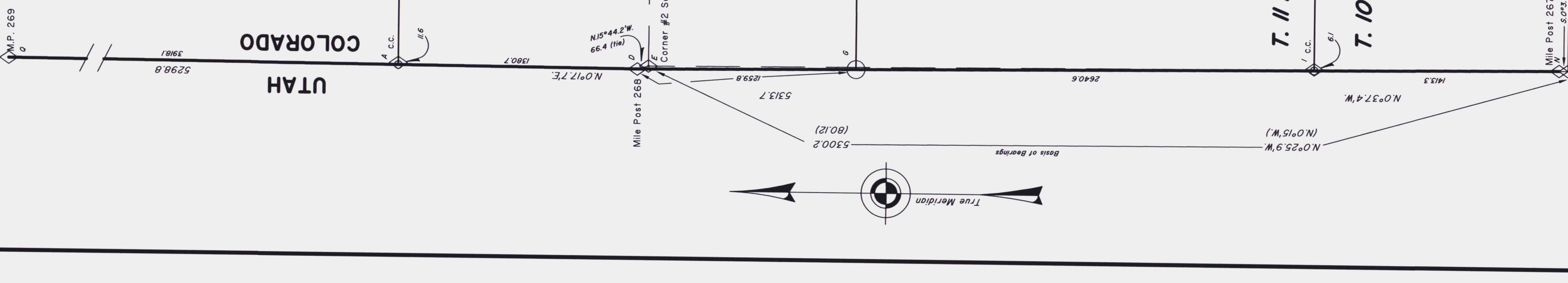
TOWNSHIP II NORTH, RANGE 104 WEST, OF THE SIXTH PRINCIPAL MERIDIAN, COLORADO.

SURVEY OF A PORTION OF BROWN'S PARK NATIONAL WILDLIFE REFUGE

MOFFAT COUNTY

Point	NAD83	UTM Zone 12 North, Meters	East
A	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
B	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
C	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
D	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
E	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
F	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
G	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
H	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
I	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
J	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
K	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
L	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
M	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
N	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
O	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
P	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
Q	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
R	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
S	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
T	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
U	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
V	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
W	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
X	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
Y	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107
Z	402°52'47.248"E, 561°33'19.131"W	52962.7	4522515.107

NOTE: The provided coordinates are for reference only by U.S. Fish and Wildlife personnel. They are not intended to legally define the boundary corners shown herein.



PURPOSE OF SURVEY

The purpose of this survey is to locate the boundaries of the following described property held in title by the United States of America and managed by the U.S. Fish and Wildlife Service (FWS).
 Township II North, Range 104 West, Sixth Principal Meridian, Section 36, Lots 16, 19, and 26, Independent Resurvey, Moffat County, Colorado.

BASIS OF BEARINGS

The bearings and distances of this survey are based on NAD 83 (CORS 96) (EPOCH: 2002.0000). Measurements were made using Global Positioning System (GPS) observations in relative positioning mode. Control points were established using the Online Positioning User's Service (OPUS) provided by the National Geodetic Survey (NGS).
 Bearings hereon are mean geodetic, referenced to the true meridian. Distances are horizontal ground distance in feet, at approximate mean elevation of 5600 feet.

HISTORY OF SURVEYS

The North, East, South boundaries of the township, subdivisional lines and a portion of the Colorado-Utah boundary were surveyed in 1882. These surveys were suspended.
 The North, East boundaries of the township were independently resurveyed, and a portion of the Colorado-Utah boundary was independently resurveyed by U.S. Deputy Surveyor, R. Clark. These surveys were approved in 1911.
 The South boundary, subdivisional lines and metes-and-bounds survey of certain parcels were independently resurveyed by U.S. Deputy Surveyor, R. Clark, approved in 1912. The metes-and-bounds survey was made to protect rights obtained from the original survey. This included Homestead Entries and School Sections.
 The SUPPLEMENTAL DIAGRAM OF Sections 25 and 36, dated August 8, 1912 was relied upon for the execution of this survey.
 Bureau of Land Management monuments dated 1963 were found on a portion of the Colorado-Utah boundary. This survey is not reported on the Rectangular Survey Index of the township, on file at the Bureau of Land Management, Denver, CO.
 A portion of the Brown's Park National Wildlife Refuge boundary was surveyed by the Bureau of Sport Fisheries and Wildlife in 1969.
 The North boundary of Section 36 and a portion of Homestead Entry #534 was independently resurveyed by Bureau of Land Management Cadastral Surveyor T. O Toole, approved 1992.

NOTICE

Notice: According to Colorado law you must commence any action based on any defect in this survey within one year from the date any defect is discovered. In no event shall any action be brought more than ten years from the date of the certification shown hereon.

EASEMENTS AND RIGHT-OF-WAYS

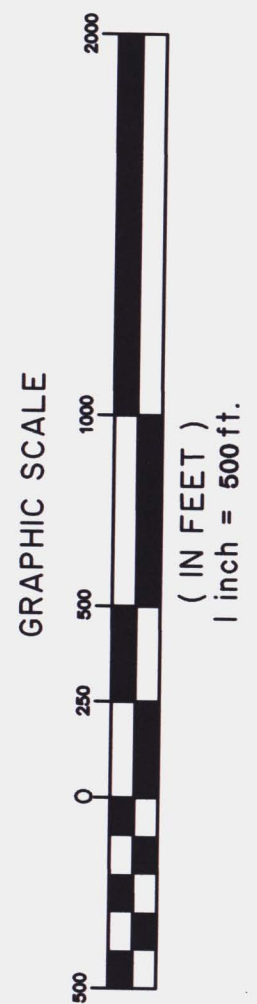
Easements and right-of-ways are not shown at the request of the U.S. Fish and Wildlife Service.

SURVEYOR'S STATEMENT

I, Howard N. Cline, Jr., a Colorado professional land surveyor, hereby state for and on behalf of the United States Fish and Wildlife Service that this survey was executed under my supervision and that the information shown hereon is true and correct to the best of my information, knowledge and belief.
 This is not a valid survey without the original seal & signature of the undersigned surveyor.
 This plat was prepared for the exclusive use of the United States Fish and Wildlife Service named in the statement hereon. Said statement does not extend to any unnamed person without an express statement by the surveyor naming said person.

UNITED STATES DEPARTMENT OF THE INTERIOR
 FISH & WILDLIFE SERVICE
 Denver, Colorado

DATE



Regional Land Surveyor

Howard Cline

Sample A

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Division of Realty

I hereby certify that the attached map of the

was prepared on behalf of the Secretary of the Interior as authorized by the Department of the Interior Manual, Part 142, Chapter 3 and by (Other State or Federal Authority, if applicable) and has been correctly platted from field notes and data obtained from official sources (*list sources*), and from field surveys of the Fish and Wildlife Service made on (date(s)); that the lot lines and other subdivision and boundary lines, as here shown, have been placed on the map after careful consideration of all available data on the subject; and that all said data as shown on the attached map have been checked by me and are correct to the best of my knowledge and belief.

Date:

Regional Land Surveyor

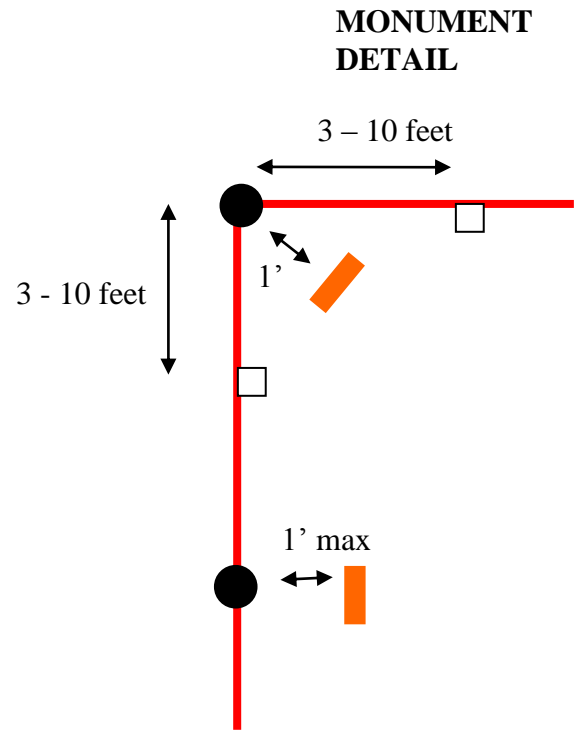
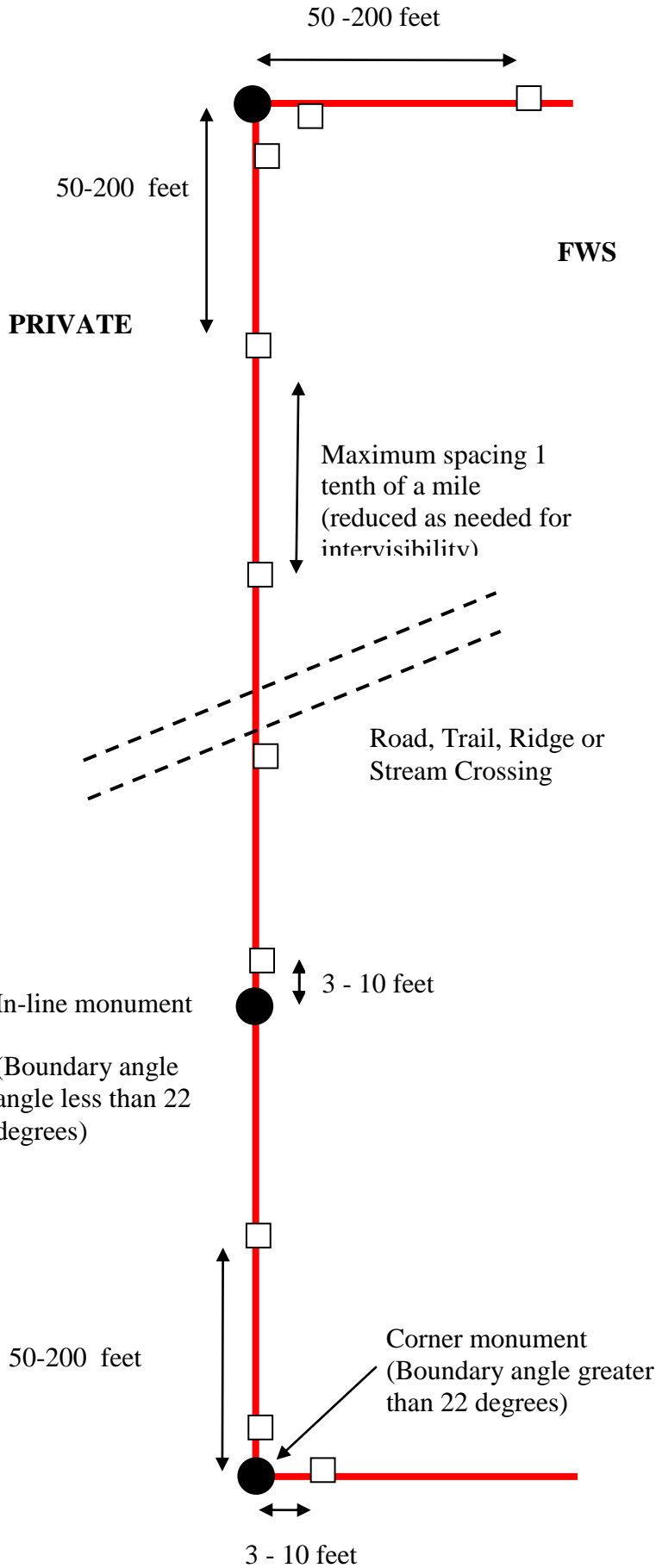
Sample B

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Division of Realty

I hereby certify that the attached map of the (United States Tract (46) Parcel F.) has been correctly platted from official plats and other data obtained from the files of the Bureau of Land Management, Department of the Interior, and from notes and other data obtained from field surveys by the Fish and Wildlife Service; that the section and lot lines and other subdivision lines, as here shown, have been placed upon said map after careful consideration of all available data on the subject; and that all said data, as shown upon the attached map, have been checked by me and are correct to the best of my knowledge and belief.

(signature)
Regional Land Surveyor

EXHIBIT 14 POSTING DIAGRAM



Legend	
Unit Boundary	
Controlling monument (Found or Set)	
Boundary Sign Post to be Installed within 1 ft. of boundary	
Fiberglass Witness post to be installed within 1 ft. of monument	
ALL WITNESS POSTS AND SIGNS FACE PRIVATE LAND	

General Topographic Survey Specifications

The following standards apply to a topographic survey of a quality suitable for final engineering design according to the normal standards and procedures of the industry.

1. On asphalt, concrete, or rock surfaces, measure points to an accuracy of 0.05 foot horizontally and vertically. On ground, make measurements to an accuracy of 0.25 foot horizontally and 0.1 foot vertically. Take shots at a nominal 50-foot maximum spacing, but be careful to measure any horizontal or vertical angle points in the ground surface or features being mapped.
2. Specify the limits of the topographic survey (valid digital terrain model). Within these limits, all visible surface improvements must be tied directly or otherwise measured in an accurate fashion, including fences, building corners, utility features, pavement, etc. Accessible underground utility features such as manholes and culverts must have invert elevations measured as well, with pipe sizes and types noted. Streams and ditches must be located and fully defined with top/toe/flowline shots as appropriate. For buildings, it is especially important to note the number of stories, material, presence or absence of concrete slabs or foundations, and location of utility connections.
3. Specify the minimum size of trees to tie, and identify them by species and diameter. Tie edge of hedges and clumps of shrubs or small trees, with species noted if known. On the edge of a wooded site, show only the line formed by the trunks of the trees, with a notation as to the most common species.
4. Obtain utility as-built information from Service records and local providers, if available, and call for location of any underground utilities in the project area. The Service may undertake potholing to locate non-electric utilities, such as water and sewer lines. Using the utility location marks and information provided by Service staff, you must make a good-faith effort to show the location of underground utilities, if any.
5. Take photographs of the general project area showing the major structures and features.

EVALUATION FOR LAND SURVEY SERVICES

NAME OF FIRM: _____ ZONE: _____

DATE OF RATING: _____ EVALUATOR: _____

EVALUATION FACTORS	ASSIGNED	RECEIVED	COMMENTS
	WEIGHT	WEIGHT	

1. (26 Points) Specific relevant qualifications of those persons listed to perform under the contract which should include individual licensing and experience related to the area of consideration.

1. Registered Land Surveyors	12		
2. Party Chief(s)	8		
3. CAD Operators	4		
4. Crews	2		

2. (30 Points) Specific experience and familiarity with cadastral surveys of rural lands, riparian boundaries, and land partitions, and with conditions within the contract area having possible effects on scheduling, costs, and complexity of procedures.

1. Experience in land partitions	5		
2. Experience in Riparian/ Littoral Boundaries	10		
3. Experience in Rural Surveys (GLO retracement)	10		
4. Wide range of experience in Zone	5		

3. (18 Points) Specific performance records on previous survey work performed for the Fish and Wildlife Service, other Federal, state, and local governmental agencies, and private industry, illustrating the quality of the organization's work and the organization's ability to meet performance schedules and cost commitments.

1. List of Clients/ Performance	18		
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4. (10 Points) Number of personnel and specific type and amount of applicable field and office equipment available for this contract.

Type and Amount of Field and Office Equipment

1. Field Equipment	7		
2. Office Equipment	3		

5. (16 Points) Demonstrated survey expertise in applications of a) GPS; b) Computer-Aided Drafting; c) Topographic surveying; d) control for, and evaluation of, mapping using LiDAR and conventional photogrammetry.

1. GPS Experience	5		
2. Computer-aided Drafting	2		
3. Topographic Surveying	4		
4. Aerial Mapping Control	5		

Total 100

Scoring Guide

Evaluation of Technical Proposals for Land Surveying Services

1. (26 Points max.) Specific relevant qualifications of those people listed to perform under the contract, which should include individual licensing and experience related to the area of consideration.

(This section scores professional qualifications and education. Experience is covered in Section 2.)

Registered Land Surveyors (LS)

+4 More than two LS (required for continuity of operations, and to meet workload)

+2 At least one LS licensed > 5 years

+1 each/2 max per person:

- Post-secondary education (in surveying or related field)
- Special Qualifications:
 - CFedS
 - Expert Witness
 - Other

Party Chiefs - Non-licensed, can be field or office technicians

+2 each: LSIT or ACSM Certification

+1 each/2 max: Post-secondary education (in surveying or related field)

+1 each/some technical or continuing education/training, professional society membership

CAD Operators

+1 each/2 max: Post-secondary education (in surveying or related field)

+1 each/2 max: Training

Crews

+1 if crews are mentioned at all (not 1-person firm)

+1 if qualifications, training, or certification is listed

2. (30 Points max.) Specific experience and familiarity with cadastral surveys of rural lands, riparian boundaries, and land partitions, and with conditions within the contract area having possible effects on scheduling, costs, and complexity of procedures.

This section scores experience both of the firm and of the Principals (LS) from all sections of the proposal, including the work samples provided.

Experience in land partitions

+1 – 5: Subjective based on number and type of projects described. Preferred are rural partitions, possibly involving conservation easements and zoning exemptions.

Experience in Riparian/ Littoral Boundaries

+1 – 10: Subjective based on number and type of projects described. Preferred are situations involving erosion/accretion/avulsion, navigability determination, and establishing boundaries based on tidal datum.

Experience in Rural Surveys

+1 – 10: Subjective based on number and type of projects described. Preferred are situations involving complex GLO retracements (fractional sections, Government lots, metes-and-bounds surveys, corner recovery) and complex deed analysis (junior/ senior rights, collateral evidence of past surveys)

Wide range of experience in the Zone

+1 – 5: Subjective based on number, type, and location of projects described. Preferred are wide range of challenging conditions and projects involving GPS control, precise leveling, LiDAR and mapping control, hydrographic surveying, and topographic surveying.

3. (18 Points max.) Specific performance records on previous survey work performed for the Fish and Wildlife Service, other Federal, State, and local governmental agencies, and private industry, illustrating the quality of the organization's work and the organization's ability to meet performance schedules and cost commitments.

This relates primarily to the performance record of the personnel listed to perform under the contract, although the organizational climate of the firm also plays a role.

List of Clients/ Performance

+1 – 12: Past performance history with FWS.

+1 – 6: Past experience with other clients. Preferred, in descending order, is experience with Federal agencies, State or other public agencies, and private firms.

4. (10 Points max.) Number of personnel and specific type and amount of applicable field and office equipment available for this contract.

Field Equipment

+1 each/ 6 max: More than 2 GPS receivers
 More than 1 total station/data collector
 4WD trucks
 ATVs
 Boats
 Precise level
 Other?

Office Equipment

+1 each/ 4 max: CAD
 COGO
 GPS software
 ArcGIS

5. (16 Points max.) Demonstrated survey expertise in applications of a) GPS; b) Computer-Aided Drafting; c) topographic surveying; d) control for, and evaluation of, mapping using LiDAR and conventional photogrammetry.

GPS Experience

+1 – 5: Subjective based on number and type of projects described. Preferred are control survey networks submitted to NGS or published using OPUS-DB, surveys for elevation determination and projects showing creativity in challenging conditions.

Computer-aided Drafting

+1 – 2: Subjective based on number and type of projects described and on the work samples provided. Preferred are projects that are well-drawn and easy to interpret.

Topographic Surveying

+1 – 4: Subjective based on number and type of projects described and on the work samples provided. Desirable are topographic surveys of wetlands, calculation of reservoir storage capacity, and projects for engineering site design. All projects should be well-drawn, with complete control documentation and explanatory notes.

LiDAR / Aerial Mapping Control

+1 – 5: Subjective based on number and type of projects described and on the work samples provided. Preferred are projects that involve control and independent QA/QC of LiDAR/aerial mapping products.