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*Fort Sill Regulation 115-11

Climate, Hydrological and Topographic Services
SURVEY CONTROL WITHIN THE FORT SILL MILITARY RESERVATION

Summary. This publication outlines procedures for the establishment, collection, maintenance, and dissemination of survey information for the Fort Sill Military Reservation and surrounding areas.

Applicability. This publication is applicable to all Fort Sill units and activities.

Supplementation. Supplementation of this regulation is prohibited without prior approval from the Directorate of Plans, Training, Mobilization, and Security, Fort Sill, OK 73503-1899.

Suggested Improvements. The proponent of this publication is DPTMS. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to DPTMS.

Distribution. This regulation is distributed solely through the DHR, ASD Homepage at http://sill-www.army.mil/dhr/Admin_Svcs_Div/Index.html.

*This regulation supersedes USAFACFS Reg 115-11, 15 May 1991.

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Chapter 1 Introduction

1-1. Purpose. This regulation outlines procedures for the establishment, collection, maintenance, and dissemination of survey information for the Fort Sill Military Reservation and surrounding areas.

1-2. References. Required and related publications; and, prescribed and referenced forms, are listed in appendix A.

1-3. Explanation of Abbreviations and Terms. Abbreviations and terms used in this regulation are explained in the glossary.

1-4. Records Management. Records created as a result of processes prescribed by this regulation must be identified, maintained, and disposed of according to AR 25-400-2, The Army Records Information Management System (ARIMS) and DA Pam 25-403, Guide to Recordkeeping in the Army. Record titles and descriptions are available on the Army Records Information Management System website (<https://www.arims.army.mil>).

Chapter 2 Policies

2-1. Grid. Positions of all Survey Control Points (SCPs) within the Fort Sill Military Reservation will be listed in trig lists and other publications with reference to the Universal Transverse Mercator (UTM) Grid.

2-2. Survey Disks. Standard survey disks (SIC, CE, USCGS, or NGS inscribed) emplaced in concrete monuments, bedrock, or permanent-type structures will be used to mark all geodetic, artillery control points and bench marks. All SCPs will have a witness post nearby to facilitate the location of monuments.

2-3. Marking. Firing Positions (FPs), Orienting Stations (OSs), Laser Positions (LPs), Radar Positions (RPs) and Observation Positions (OPs) will be concrete monuments, approximately 8-10 inches in diameter. A standard survey disk or an ammo shell casting will identify the point over which an instrument must be plumbed. A witness post will identify the monument. End of Orienting Lines (EOLs) will be identified by metal survey quad markers erected over a survey control point, or by a six-foot high black, and white pole set in concrete. These 15 foot high survey quad marks are highly visible metal tripods positioned over various critical SCPs.

2-4. Approval. Units are not permitted to install concrete monuments without prior written approval from the Chief, Survey Information Center (SIC), Range Branch, Directorate of Plans, Training, Mobilization, and Security (DPTMS). If the request is approved, SIC personnel will supervise the monument emplacement. Upon completion of the survey, units must submit DA Form 4446 (Level, Transit, and General Survey Record Book) and computations to the SIC for a final check and filing.

Chapter 3

Classification and standards of accuracy of Survey Control

3-1. Survey Control Points. Survey control points are either horizontal control points, vertical control points, or both, and will be marked accordingly.

a. Horizontal Control Points. These designate locations of points by the UTM grid or geographic coordinates. The Fort Sill trig list will list both types of coordinates. Horizontal control points are reference to the **1983** North American Datum.

b. Vertical Control Points (Bench Marks). These designate precise ground elevations in meters and feet. The Fort Sill trig list will list both types of measurements. Vertical Control Points are referenced to the **National Vertical** Datum of 1929.

c. Survey Control Points with Horizontal and Vertical Control. These designate both locations and precise ground elevations and are referenced to the appropriate datum's listed above.

3-2. Accuracy. Horizontal and vertical control points are classified by their relative accuracy and certain other standards and specifications in accordance with the Federal Geodetic Control Committee's (FGCC) "Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys" (first through third order) and FM 6-2, Field Artillery Survey, (fourth and fifth order). The closing accuracy's are summarized in **table 3-1**.

Table 3-1. Survey Accuracy Requirements

HORIZONTAL CONTROL POINTS	CLOSING ACCURACY
First Order	1 part in 100,000 (minimum)
Second Order, Class I	1 part in 50,000
Class II	1 Part in 20,000
Third Order, Class I	1 Part in 10,000
Class II	1 part in 5,000
Artillery Fourth Order	1 part in 3,000 or \sqrt{K} for Traverse over 9,000 meters
Artillery Fifth Quarter	1 part in 1,000 (firing position)
VERTICAL CONTROL POINTS	CLOSING ACCURACY
First Order, Class I	3mm
Class II	4mm
Second Order, Class I	6mm
Class II	8mm
Third Order	12mm
Artillery Fourth Order	\sqrt{K}
Artillery Fifth Order	+2 meters for distance less than 4 km 1.2 x \sqrt{K} for distance greater than 4 km

LEGEND: K = distance in kilometers
mm = millimeters

Chapter 4 Responsibilities

4-1. Range Control. The Survey Information Center (SIC), Range Control, DPTMS, has overall responsibility for monumented survey control points including SCPs, benchmarks, firing positions, orienting stations, radar positions, laser positions and observation posts on Fort Sill. In the fulfillment of this mission, SIC will-

- a. Perform necessary field work and computations to establish permanent firing positions, orienting stations, end of orienting lines, artillery and geodetic control points, and vertical control points.
- b. Conduct astronomic observations when required for precise azimuth determination.
- c. Maintain a current file, including supporting field notes and computations, on established SCPs.
- d. Plan future extensions of geodetic and artillery control, both horizontal and vertical.
- e. Plan extensions and supplements to firing positions, radar positions, laser positions, and observation posts.

f. Evaluate and take action on requests for additional SCPs and coordinate the efforts of agencies involved.

g. Annually, make a complete inspection of firing positions and replace missing or destroyed monuments and witness posts and if possible or needed, request support from other post survey assets to assist in the inspections.

h. Annually, recover artillery, geodetic control points and bench marks and take the appropriate action needed.

i. Install and maintain permanent metal survey quad markers over designated SCPs.

j. Maintain the Fort Sill calibration base line which is used to calibrate precise distance measuring equipment, both military and civilian.

k. Biennially, update, publish, and disseminate both artillery/geodetic trig lists and firing position trig lists.

l. Update and revise firing positions, radar positions, and laser positions overprint for the Fort Sill special range map, as required.

m. Disseminate to military users, an update to the trig list for changed or new survey data not yet published.

n. Support activities and serve as liaison for the [National Geospatial Intelligence Agency \(NGA\)](#), National Oceanographic and Atmospheric Administration (NOAA), Army Corps of Engineer (CE), U.S. Army Topographic units, and other U.S. Government surveying agencies when these organizations are performing survey functions on Fort Sill.

o. Maintain liaison with and advise all survey units on post, on matters pertaining to survey.

4-2. OTC Fire Support Test Directorate. With the written approval from the Chief, Range Branch, the [OTC Fire Support Test Directorate](#) is authorized to establish permanent SCPs and firing positions to support its testing requirements. However, existing Fort Sill SCPs and firing positions will be used whenever possible. Upon completion of the survey and prior to the use of these new SCPs and firing positions, the [OTC Fire Support Test Directorate](#) must furnish the DA Form 4446 and their computations to the SIC for the final check and filing. The [OTC Fire Support Test Directorate](#) will be responsible for the maintenance, marking, and update of its points. SCPs and firing positions are required to be removed after the testing is completed, unless written approval is granted to maintain the point on Fort Sill.

4-3. Users. Users of Survey Control on Post. Users will immediately notify the SIC if any SCPs, firing positions, or witness posts are missing or damaged.

4-4. Directorate of Public Work. The Directorate of **Public Works (DPW)** upon request will--

a. Upon approval of work order (DA form 4283) and quad chart, manufacture, repair, and repaint permanent quad markers (see para 2-3).

b. Upon service order request, furnish an operator and a truck-mounted auger to make excavations for survey monuments.

c. Upon request, DPW, Master Planning will provide SIC with construction updates and GIS information for buildings, roads, or facilities planned for any area within Fort Sill boundaries.

Chapter 5

Survey Procedures for Training Area Artillery Fire

5-1. Live Fire. Survey personnel will use the tactics, techniques, and procedures (TTP) prescribed in FM 6-2 when surveying artillery and target acquisition system positions. Due to the proximity of the civilian population to the Military Reservation, an additional safety precaution is required for all surveys. All surveys for positions involving live fire must be closed on the starting point or second known point. This is to include conventional surveys, Position and Azimuth Determining System (PADS) surveys, and Improved Position and Azimuth Determining System (IPADS) surveys.

5-2. Circular Error Probable (CEP). Due to the circular error probable (CEP) of PADS/IPADS surveys, computation of the azimuth of orienting lines which utilize a PADS/IPADS point is prohibited. Specifically this prohibition includes computing the azimuth between two PADS points or between a conventional point/SCP and P-DS point. Azimuth lines established using PADS/IPADS will be accomplished by autoreflection or the two-position mark method.

5-3. PADS Update. Unit survey personnel will not drive PADS/IPADS vehicles over Fort Sill survey control points marked with quad markers. An autoreflection will be accomplished during update procedures at points with quad markers, as prescribed in FM 6-2.

5-4. Survey Data. All survey data, to include PADS data, will be recorded in Level, Transit, and General Survey Record Book as prescribed in FM 6-2. Field notebooks and/or conventional computations will be subject to inspection by Range Branch SIC personnel.

5-5. Verification. All surveys performed either conventionally or by PADS/IPADS will be verified by a second method. Graphic resection, resection, or map spot to ensure the surveyed coordinates are within 100 meters.

Appendix A References

Section I Required Publications

AR 25-400-2

The Army Records Information Management System (ARIMS)

DA Pam 25-403

Guide to Recordkeeping in the Army

FM 6-2

Field Artillery Survey

Section II Related Publications

DMA Technical Manual 8358.1

Datums, Ellipsoids, Grids, and Grid Reference Systems

DMA Technical Report 8350.2

World Geodetic System 1984

STANAG 2373/QSTAG 269

Survey Accuracy Requirements for Surface-to-Surface Artillery

Section III Prescribed Forms

DA Form 4283

Facilities Engineering Work request

DA Form 4446

Level, Transit, and General Survey Record Book

Section IV Reference Forms

DA Form 2028

Recommended Changes to Publications and Blank Forms

Glossary

Section I Abbreviations

ARIMS

Army Records Information Management System

CE

Corps of Engineers

CEP

Circular Error Probable

DPTMS

Directorate of Plans, Training, Mobilization and Security

DPW

Directorate of Public Works

EOL

End of Orienting Line

FGCC

Federal Geodetic Control Committee

FM

Field Manual

FP

Firing Point

IPADS

Improved Position and Azimuth Determining System

LP

Laser Point

NGA

National Geospatial Intelligence Agency

NGS

National Geodetic Survey

NOAA

National Oceanographic and Atmospheric Administration

OP
Observation Point

OS
Orienting Station

OTC
Operational Test Command

PADS
Position and Azimuth Determining System

RP
Radar Position

SCP
Survey Control Point

SIC
Survey information Center

TTP
Tactics, Techniques and Procedures

USCGS
United States Coast and Geodetic Survey

UTM
Universal Transverse Mercator

Section II
Terms

This section contains no entries

Section III
Special Abbreviations and Terms

This section contains no entries

IMWE-SIL-PLT



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