

02 - GIS, Drafting & Surveying Standards

354th Civil Engineering Squadron

OPR: CES/CENM

ISSUED: 14 April 2017

Purpose

This document is provided for informational purposes and to assure data compatibility and compliance for as-built drawings or vector data formats specifically for the 354th Civil Engineer Squadron (CES) and its assets. Specific questions may be addressed to the 354th CES/Geobase.

1. General

1.1. Map Projection and Datum

- 1.1.1. Universal Transverse Mercator (UTM), World Geodetic System 1984 (WGS84) datum, Zone-6N, Units – Meters.
- 1.1.2. Vertical Datum: NAVD 88.
- 1.1.3. The coordinate system and vertical datum shall be noted in the drawing in the metadata.
- 1.1.4. Eielson local grid coordinates shall not be used.

1.2. Coordinate System Standards

- 1.2.1. All drawings shall be geo-referenced to the above coordinate system.
- 1.2.2. The existing network of survey monuments at Eielson AFB shall be used to establish control for all drawings. Drawings shall be based upon the established projection and coordinate system at Eielson AFB. Survey control monument coordinates are published and maintained by the National Geodetic Survey.

1.3. Ownership

- 1.3.1. The Government, for itself and such others as it deems appropriate, will have unlimited rights under this contract to all information and materials developed under this contract and furnished to the Government and documentation thereof, reports, and listings, and all other items pertaining to the work and services pursuant to this agreement including any copyright. Unlimited rights under this contract are rights to use, duplicate, or disclose text, data, drawings, and information, in whole or in part in any manner and for any purpose whatsoever without compensation to or approval from the contractor.

1.4. Delivery Media and Format

- 1.4.1. Format. A copy of all data and files developed under this contract shall be delivered to the Government in digital format (insert the appropriate submittal time: e.g., at project completion, with each submittal as required in the Schedule of Work, etc.). All digital files shall be provided on compact disk, read-only memory (CD-ROM) in ISO-9660 format, compatible with the Government's Target GIS hardware. A "Readme.txt" file must be included with the delivered digital media that includes normal transmittal information. The digital media used shall be fully compatible with the Government's Target GIS.

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- 1.4.2. Label. The external label for each digital media shall contain, as a minimum, the following information:
- a. If projects reference an existing facility or infrastructure with Real Property ID, the project name should be in the following format: B99999 FTQW XX-XXXX Project Description where B99999 is the Real Property ID, FTQW XX-XXXX is the ACES/TRIRIGA Project identifier, and Project Description is a brief synopsis of the project.
 - b. Contract Number (and Delivery Order Number if applicable) and date.
 - c. Format and version of operating system software.
 - d. Name and version of utility software used for preparation (e.g., compression/decompression) (if applicable) and copying files to the media.
 - e. Sequence number of digital media.
 - f. List of file names on the digital media (as space on the label permits).

2. Standards for Geographical Information Systems (GIS) Deliverables

2.1. Target Technologies

- 2.1.1. Geospatial Information System Software: Environmental Systems Research Institute (ESRI) ArcGIS 10.X
- 2.1.2. Geospatial Information System Data Format: Spatial Data Standard for Facilities, Infrastructure and Environment (SDSFIE), Version 3.1, ESRI File Geodatabase.

2.2. Content Standards for Digital Geospatial Metadata

- 2.2.1. The ability to use existing geospatial data is important to individuals in various organizations who are trying to share data. Metadata or “data about data” is the key to developing this ability. Metadata describes the content, quality, condition, and other characteristics of geospatial data.
- 2.2.2. Geodetic Control Surveys. Services include horizontal and vertical control surveys for the precise location of primary survey points for planning, engineering, construction, real estate projects, GIS applications, or facility management. These surveys include third-order or higher horizontal and vertical control, geodetic astronomy, gravity, and magnetic surveys in accordance with the Standards and Specifications for Geodetic Control Networks published by the Federal Geodetic Control Committee dated September 1984. Conventional, inertial, satellite, and other traditional precise survey methods as determined to be the most cost-effective means that will achieve the required accuracy of the final product may be used.
- 2.2.3. Topographic and Engineering Surveys. Services include but are not limited to field acquisition and office data reduction of detailed topographic and planimetric feature data for Eielson Air Force Base to support airfield pavement evaluation, engineering site planning, cost estimating, design, construction layout and alignment

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of roads, buildings, and other structures, installation master planning, and recording as-built conditions and GIS applications. Field data acquisition includes both conventional and other methods, such as a plane table, total station, or GPS.

2.3. Graphic Format

2.3.1. All surveying, mapping, and/or GIS graphical digital data generated by the contractor and supplied to the Government shall be fully compatible with, ESRI ArcGIS, Version 10.X native digital format, with a Windows 7 operating system. The contractor shall ensure that all digital files and data (e.g., base files, reference files, symbol libraries, etc.) are compatible with the Government's target GIS (i.e., GIS software, operating system, RDBMS software, schema) and adhere to the standards and requirements specified herein. The term "compatible" means that data can be accessed directly by the target system without translation, preprocessing, or post-processing of the digital data files. It is the responsibility of the contractor to ensure this level of compatibility.

2.3.2. The contractor shall utilize topology and data reviewer checks as needed. To assure that there are no overshoots or undershoots in the line work.

2.4. Mapping and GIS Standards

2.4.1. All mapping and GIS work performed as part of this contract shall conform to the following standards for accuracy, content, and structure:

2.4.2. All large-scale mapping projects (scales equal to or larger than 1: 24,000), shall follow the Government Standards (Army, Navy, Air Force) and/or "ASPRS Accuracy Standards for Large Scale Maps" (ASPRS 1990) classification standard. Small scale mapping (scales smaller than 1:24,000) projects will follow the OMB "United States National Map Accuracy Standards" (Bureau of the Budget 1947). All spatial data generated shall conform to SDSFIE 3.0. The contractor shall submit a written request for approval of any deviations from these established standards. No deviations from these established standards will be permitted unless prior written approval of such deviation has been issued by the Contracting Officer.

2.4.3. SDSFIE 3.0 schema; All GIS deliverables will include the following filled out in the attribute tables:

2.4.4. All data:

- a. Feature description fields (usually the SDSFEATUREDESCRIPTION field)
- b. Installation Date (DDMMYYYY)

2.4.5. Utilities:

- a. Quantitative information fields (diameter, volume, voltage, or equivalent fields)
- b. Unit of measurement fields (Inches, gallons, volts, or equivalent fields)

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- c. Material type fields (steel, aluminum, stone, water, JP-8, or equivalent fields)

2.4.6. Transportation:

- a. Material type field (asphalt, concrete, steel, equivalent fields)
- b. Unit of measurement fields (Inches, gallons, volts, or equivalent fields)
- c. Clearances (horizontal, (vertical for bridges))

2.5. Metadata Generation

2.5.1. Contractor shall provide metadata files for all geospatial and GIS data and products produced under this contract. Geospatial data are defined as information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth. Geospatial data affected by these requirements are those generated in the following systems:

- a. Geographic Information System (GIS);
- b. Land Information System (LIS);
- c. Remote Sensing or Image Processing system;
- d. Automated Mapping/Facilities Management (AM/FM) system;
- e. Other computer system that employs or references data using either absolute, relative, or assumed coordinates.

2.5.2. The digital metadata files shall be provided to the Government along with each final product deliverable, unless otherwise approved in writing by the Contracting Officer. The following sections within the Metadata (Description) tab for Features Classes / Shapefiles must be completed:

- a. Title: Name of the Feature Class
- b. Tags: Key words that describe the data set: type, spatial location, and usage)
- c. Summary: List the purpose, along with date collected.
- d. Description: Describe standards used such as coordinate system, datum and survey accuracy. Include information if any tables are joined or associated ancillary data such as photos.
- e. Credits: List what entity collected the data, including the contact information for follow up (address and phone number).

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3. Drawing Formats and Standards for Computer Aided Drafting and Design (CADD) Deliverables

3.1. CADD Drawing Formats and Standards

- 3.1.1. PACAF installations use the A/E/C CADD Standard published by the CADD/GIS Technology Center for Facilities, Infrastructure and Environment for all computer-aided drafting and design-generated “as-built” drawings. The standard is published at <https://caddbimcenter.erdcdren.mil/>
- 3.1.2. Drawings shall be in AutoCAD 2010 or more current release Drawing File (.DWG) format. Educational versions and or student formatting are not permitted.
- 3.1.3. Drawing sheets shall be 22 x 34 (ANSI D size)
- 3.1.4. Drawing sets for individual projects Drawing sets for individual projects shall include a cover sheet, or sheets, with the following information:
 - a. Eielson project number and name, and “PACIFIC AIR FORCES, 354th Civil Engineer Squadron, Eielson AFB, Alaska” in large lettering;
 - b. Base Map, indicating project location;
 - c. Project Site Plan; and
 - d. Drawing Schedule.
- 3.1.5. A title block on each drawing sheet shall include the following information:
 - a. Real Property Facility ID;
 - b. Project Title;
 - c. Eielson ACES/TRIRIGA Project Number;
 - d. Drawing Title;
 - e. Sheet Reference Number;
 - f. Sheet [#] of [total number of sheets in the set];
 - g. “354 Civil Engineer Squadron, Eielson AFB, Alaska”;
 - h. Drawing date;
 - i. Blocks for Designer’s name, Draftsman’s name, Air Force Project Manager’s name and Eielson’s Chief Engineer’s name;
 - j. Space to list drawing revisions;
 - k. Space for the Designer’s professional stamp; and
 - l. Design Firm’s name or logo.

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- 3.1.6. No non-standard fonts or shape files shall be used.
- 3.1.7. PACAF installations use the United States National CAD Standard for guidelines on formats and standards for features inside buildings, vaults, or other structures. The standard is published at <http://www.nationalcadstandard.org>.

3.2. Quality Assurance (QA)/Quality Control (QC)

- 3.2.1. The contractor shall insure that any and all products provided to the Government have received careful and complete QA/QC.
- 3.2.2. The Government will immediately return for remedial action (at the Contractor's expense) any products that do not meet these specifications.
- 3.2.3. Before a file is placed on the delivery digital media, the following procedures shall be performed:
 - a. Remove all extraneous graphics outside the border area and set the active parameters to a standard setting or those in the Government-furnished seed file.
 - b. X-refs shall be bound, without device or directory specifications, to the drawings that reference them.
 - c. All digital files shall be delivered to the Government uncompressed.
 - d. Include all files, both graphic and nongraphic, required for the project (i.e., color tables, pen tables, font libraries, symbol libraries, user command files, plot configuration files, AML plot routines, etc.). Applicable plotstyle (.ctb) files shall be provided with the drawings.
 - e. Each finished CADD drawing or map shall have its own separate plot file.
 - f. Make sure that all support files such as those listed above are in the same directory and that refers to those files do not include device or directory specifications.
 - g. Include any standard sheets (i.e., abbreviation sheets, standard symbol sheets, etc.) necessary for a complete project.
 - h. Document any fonts, tables, symbols, cells/blocks, line styles/types, details, reference drawings, etc., developed by the contractor. The contractor shall obtain Government approval before using anything other than the Government's standards.

4. Standards for GPS Survey Deliverables

4.1. Deliverables

- 4.1.1. The format will be GIS product (reference Section 2 above).
- 4.1.2. Survey Accuracy: Third Order 5.0 cm or better.

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- 4.1.3. Survey Field Notes shall be included. A surveyor's narrative report shall be prepared and submitted by the surveyor or in responsible charge as documentation of the survey project. The surveyor's narrative report shall include:
- a. Make and Model of the GPS receiver, Antenna, and related equipment;
 - b. A processing generated report or summary of all RTK field operations, including calibrations, duplicate point measurements;
 - c. A processing generated report regarding the baseline processing results and the software and version number used;
 - d. A processing generated report regarding the Network adjustment results including a summary of covariance's, standard deviation or RMS values and the software and version number used;
 - e. A network diagram, true line diagram or map showing the network configuration as designed;
 - f. A list of the HARN, CORS or reference stations used in the survey;
 - g. A list of coordinates by station, including the datum, geoid model, epoch, and measurement units used;
 - h. Local and Network Accuracies; and
 - i. Document any variations from these guidelines.