

**Edwards Air Force Base Standards for Geographic  
Information System (GIS) Deliveries**

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## TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page No.</u>
<b>1.0</b>	<b>PURPOSE.....</b>	<b>1</b>
<b>2.0</b>	<b>PROJECT DESCRIPTIONS.....</b>	<b>1</b>
<b>3.0</b>	<b>GOVERNMENT-FURNISHED PROPERTY .....</b>	<b>2</b>
<b>4.0</b>	<b>DELIVERY REQUIREMENTS.....</b>	<b>2</b>
4.1	System Parameters.....	2
4.2	Database Design .....	3
4.3	Graphics Design .....	3
4.4	Data Dictionary.....	4
4.5	Feature Definitions .....	4
4.6	Metadata .....	5
4.7	GIS Media Specifications.....	5
4.8	GPS Data Collection Specifications .....	5
<b>5.0</b>	<b>QUALITY ASSURANCE/QUALITY CONTROL .....</b>	<b>6</b>
<b>6.0</b>	<b>MILESTONES .....</b>	<b>6</b>
	<b>ATTACHMENT A.....</b>	<b>7</b>

## **1.0 PURPOSE**

This document describes the standards that must be met for the successful completion of a contracted delivery of data to be incorporated into, or used in tandem with, the Geographic Information System (GIS) at Edwards Air Force Base (AFB), California. This document forms the basis for technical Statements of Work (SOWs) for projects and contracts solicited by the Air Force Flight Test Center (AFFTC) at Edwards AFB, which will include a GIS delivery as part of the workflow. The purpose of this document is to provide reliable guidelines with which to create, enhance, or modify the Air Force Flight Test Center (AFFTC) GIS currently in use at Edwards AFB.

Project-specific contract parameters must be added to this baseline document during the creation of a specific SOW. The nature and scope of a given project make it unique, with requirements that will need to be met in regard to graphic and database design, and data acquisition methodologies. This document provides baseline standards that should be built upon for any given contract.

## **2.0 PROJECT DESCRIPTIONS**

Contractors shall furnish all necessary personnel, material, equipment, services, and facilities to perform the work described in the SOW unless otherwise indicated. Services or products, which can be expected to be within an SOW, but are not limited to, the following:

1. Digitize or scan graphic or textual information sources into a digital format.
2. Create tabular database files.
3. Collect primary data using approved global positioning system (GPS) equipment and/or explicitly stated field data collection methodologies.
4. Compile graphic data using aerial photogrammetric techniques.
5. Create featurized and/or attributed data files with appropriate graphic-to-table linkages.
6. Produce hard copy graphic or tabular data outputs from GIS data.
7. Make approved modifications to existing GIS data provided by the AFFTC GIS laboratory as required to meet specific project requirements.

This document does not apply to contracts that will involve property boundary or other legally binding surveys. Contractors or clients completing such work should contact the AFFTC GIS laboratory during the creation of the SOW for coordination and inputs on a project-specific basis.

### **3.0 GOVERNMENT-FURNISHED PROPERTY**

The AFFTC GIS laboratory or AFFTC may make source documents available to the contractor as deemed necessary to meet project requirements. Source documents may include, but not be limited to, the following:

1. Digital or paper maps
2. Aerial photographs
3. Tabular GIS data files
4. Data Dictionary
5. Metadata

Other equipment such as, but not limited to, GPS receivers may be made available to the contractor by the AFFTC GIS laboratory under approval of AFFTC personnel. Arrangements for the use of such equipment must be made directly with the AFFTC GIS laboratory at Edwards AFB.

The contractor will be responsible for all materials supplied by the AFFTC GIS laboratory or AFFTC. Any GIS data, or products resulting from the use of that data, which are provided to the contractor by AFFTC may not be further distributed (or otherwise made available) to external parties without prior written permission from AFFTC. The contractor may adapt, convert, reformat, translate, or otherwise modify all, or any part, of the provided data only for purposes of completing contract requirements. A written record of all changes made will be kept and submitted as part of the required metadata portion of the GIS delivery.

### **4.0 DELIVERY REQUIREMENTS**

#### **4.1 System Parameters**

The AFFTC GIS laboratory at Edwards AFB uses Intergraph Modular GIS Environment (MGE) as its standard GIS platform, Oracle as its primary database software, and Windows NT as its operating system.

GIS files being created for delivery to AFFTC shall be prepared in conformance with the *Edwards AFB Geographic Information System Parameters* as shown in Attachment A.

All GIS graphic files will be projected and georeferenced according to the specifications described in the *Edwards AFB Geographic Information System Parameters* as shown in Attachment A.

GIS files which add to, replace, or otherwise modify standard base map graphics files or attribute tables (such as roads or utilities) must coordinate with the GIS section of the 95<sup>th</sup> Civil Engineering Group Maintenance Planning and Programs Office.

All figures included in a report that accompany the project will be delivered in a digital format. Any map-related image data sources (\*.tif, \*.jpg, etc.) presented in the document, or as part of any presentation made to AFFTC related to this specific undertaking, will be delivered in digital, georeferenced format.

## 4.2 Database Design

Contractors should request a copy of the relevant database schema from the AFFTC GIS laboratory prior to database design, data collection, or other data creation phases of the project. Standard contracts will require contractors to utilize existing schema definitions of features and predefined attribute table structures. Deviations from, or additions to, existing schema objects must be approved by AFFTC in writing prior to the delivery of any GIS product. Schema files will be provided to the contractor by the AFFTC GIS laboratory.

The preferred delivery format for all GIS attribute tables is a comma delimited, ASCII text file format with all column headings specified. A different database program may be used to create data that will accompany the GIS delivery if approved by, and coordinated with, the AFFTC GIS laboratory prior to file delivery.

Five standard metadata fields must be included in each database table created for inclusion into the Edwards AFB GIS. These are as follows:

<b>Column</b>	<b>Data type/precision</b>	<b>Description</b>
data_source_d	varchar2(6)	The original source of the data (see domain list)
data_creator	varchar2(20)	The creator of the data added to the GIS
data_create_date	number(10)	Date that the data was input into the GIS (Format '20000329')
data_modify_date	number(10)	Date the data is modified in the GIS (Format '20000329')
data_attri_conf_d	varchar2(6)	Confidence of attribution data (see domain list)
data_posit_conf_d	varchar2(6)	Positional confidence of the object location (see domain list)
data_history	varchar2(14)	Reference to the metadata document
data_maintainer	varchar2(20)	Organization responsible for data maintenance

## 4.3 Graphics Design

Contractors shall deliver graphics files that match the existing element symbology and typology for each type of feature in use on the Edwards AFB GIS. If a new feature must be created, the AFFTC GIS laboratory must approve its definition and use prior to file delivery.

The contractor may request copies of existing graphics appropriate to the SOW as agreed upon by AFFTC and the AFFTC GIS laboratory. The AFFTC GIS laboratory will provide such files in MGE (design files), ArcView (shape files), or GeoMedia format (Microsoft Access).

All cells used by the contractor must be fully compatible with the Edwards AFB GIS. A copy of relevant cell libraries will be provided to the contractor by the AFFTC GIS laboratory on request. New cells may be created for addition to the Edwards AFB GIS upon approval by the AFFTC GIS laboratory.

All mapping data will be delivered to Edwards AFB with clean line work using the following parameters:

1. All intersecting lines will be processed to remove overshoots and undershoots.
2. Zero length segments will be removed.
3. Different feature types will not share a common line segment.
4. Area features will include featurized centroids (MGE Only).
5. All files will be delivered uncomplexed (MGE Only).
6. All delivered files will be checked to see that they are corruption-free.
7. No linear pattern components (class 5 elements) are to be stored in graphic design files; they should be delivered in plotting files with an extension representing the scale at which the file should be plotted (i.e. "050, 200").

#### **4.4 Data Dictionary**

Accompanying the final GIS delivery will be a digital data dictionary file that has been previously approved by AFFTC and the AFFTC GIS laboratory in terms of expected content and format. Included in the data dictionary will be a definition of each table and each column within the table. The table definition shall include the purpose, structure, and a list of any associated features. The column definition shall include the data type, data precision, and a brief description of each of the values that may be included in the column (including an explanation of any abbreviations or codes that are utilized). If an extensive number of abbreviations or codes will be utilized to populate a column, a separate domain list shall be provided. A domain list should be used anywhere a set defined group of options is the only choice for attribute population if it's extensive or not (i.e., if the only possible option for a field is Yes and No then a domain list is required to avoid invalid data population). All domain list values should be accompanied by a description especially in the case of abbreviations.

#### **4.5 Feature Definitions**

New features that are created by the contractor for inclusion into the Edwards AFB GIS will be defined in a stand-alone document or data table. Elements of the feature that must be declared in this documentation include:

1. Feature name.
2. Category.
3. Level.
4. Color.
5. Weight.
6. Symbology.
7. Font.

8. Cell.
9. Element type.
10. Digitizing commands.
11. List of design files into which it has been placed.
12. Associated attribute table (if any).

Any new features which are created for an MGE GIS delivery to be included in the Edwards AFB GIS must be coordinated with the AFFTC GIS laboratory prior to delivery.

#### **4.6 Metadata**

Accompanying the final GIS delivery will be a sufficient level of metadata regarding the project files to allow a reasonable understanding of the source, accuracy, modifications to, and applicability of the data provided. All submitted metadata must follow Federal Geographic Data Committee (FGDC) Standards specified in *Content Standard for Digital GeoSpatial Metadata (FGDC-STD-001-1998)* (FGDC 1998). The FGDC Standards can be found at <http://www.fgdc.gov/standards/standards.html>. All metadata should be submitted in text (\*.txt) or Microsoft Word (\*.doc) file format.

#### **4.7 GIS Media Specifications**

The AFFTC GIS Laboratory is currently able to accept deliveries of electronic data on the following media:

1. 3.5" diskette.
2. 8mm tape:
3. 2.3– 14 GB (NT Backup, CPIO, TAR, BackupExec).
4. 20 or 40 GB Mammoth Tapes (NT Backup, BackupExec, Windows 98 Backup, MaynStream [2.5-3.1], and Sgotos Premium).
5. CDs in ISO format.
6. 100 MB ZIP disks.

#### **4.8 GPS Data Collection Specifications**

The AFFTC GIS laboratory will accept GPS data only if the positional data are differentially corrected to assure locational accuracy. When mapping area boundaries GPS positions should be corrected so that any location mapped is less than five meters from its true position. For linear or point features, positional GPS data should be corrected using differential correction techniques that will place the object within less than a meter of its true location. Use of GPS receivers to record construction-grade drawings is not recommended; the AFFTC GIS laboratory must specifically approve such practice if the drawings are intended to be included in the Edwards AFB GIS.

Field data recorders may be used in conjunction with GPS receivers if the collected attribute data format and definition is compatible with existing schema information. The use of such recorders is encouraged, but must be approved and coordinated with the AFFTC GIS laboratory.

## **5.0 QUALITY ASSURANCE/QUALITY CONTROL**

Unless otherwise specified in the SOW the contractor is responsible for performing quality assurance and quality control checks of all GIS data files prior to delivery to the AFFTC GIS laboratory. All data (graphic and nongraphic) must work with the existing AFFTC GIS system upon submittal. Erroneous files will not be accepted and will be returned to the contractor for review and correction prior to formal acceptance of the GIS product delivery.

## **6.0 MILESTONES**

Preliminary technical consultation shall be accomplished within 30 days of the contract start date, and shall include the submittal of a list of the expected GIS files, the proposed database structure, and an electronic test layer or theme which includes both graphic information and linked attribute data for technical evaluation. At this time (or earlier) a member of the AFFTC GIS laboratory technical staff will be formally assigned as a point of contact for the project.

A technical data description (including the database structure and a description of the attributes to be collected) shall be finalized no later than 60 days from the start of the project.

Approval of the proposed data dictionary content and format shall be accomplished no later than midway through the project lifecycle.

At the completion of the project the contractor will deliver a fully functional set of digital GIS files to include both graphic files (if applicable) and the accompanying database tables with all feature and attribute linkages in working order. These files will be evaluated and approved by the AFFTC GIS laboratory and AFFTC prior to formal acceptance of the delivery.

# ATTACHMENT A

## Edwards AFB Geographic Information System Parameters

### Coordinate System:

State Plane Coordinate System 1983

Zone Number: 405

Zone Name: California 5

Units of Measure: Survey Feet (Conversion factor: 1 US Survey Foot = 1200/3937 Meter [Exact], or 1 US Survey Foot = 0.30480060960 Meter)

### Projection Name:

Lambert Conformal Conic

### System Parameters:

Longitude of Origin:	-118:00:00.0000	d:m:s
Latitude of Origin:	33:30:00.0000	d:m:s
Standard Parallel 1:	34:02:00.0000	d:m:s
Standard Parallel 2:	35:28:00.0000	d:m:s
False Easting:	6561666.6667	survey feet
False Northing:	1640416.6667	survey feet

### Geodetic Datum:

North American 1983

### Ellipsoid:

GRS80

### Ellipsoid Parameters:

Equatorial Radius:	20925604.4742 survey feet
Polar Radius:	20855444.8840 survey feet
Eccentricity:	0.0818191910428158
Flattening:	0.00335281068118232
Flattening Inverse:	298.257222101

### Vertical Datum:

North American Vertical Datum 1988

### Height Type:

Orthometric

### Undulation Model:

Average Undulation

### Average Undulation:

0.0 survey feet

### Mapping Working Units:

1000 Units of Resolution per survey feet

### Global Origin:

X = 4294967.2940

Y = -0.000

Z = -2147483.6470