

47 CES/CENME GIS/As-BUILTS DELIVERABLE REQUIREMENTS



Prepared by the
Laughlin Air Force Base GeoBase Office
47th Civil Engineer Squadron
25 April 2024 - Version 1.0

Table of Contents

1	GIS Deliverables Requirements.....	3
1.1	Purpose & Scope.....	3
1.2	Spatial Coordinate System.....	3
1.2.1	XY Coordinate System	3
1.2.2	Geometry Properties	4
1.3	GIS Data Format	4
2	Surveying.....	5
2.1	Field Reconnaissance and Surveying.....	5
2.2	Survey Data Requirements	5
2.3	Additional Requirements	6
3	As-Builts Deliverables Requirements.....	6
3.1	Purpose & Scope.....	7
3.2	As-Built Deliverable Formats.....	7
3.3	Drawings Unit of Measure.....	7
3.4	CAD As-Built Requirements for LAFB	7
3.5	Existing Records	8
4	Point of Contact	8

1 GIS DELIVERABLES REQUIREMENTS

1.1 PURPOSE & SCOPE

The purpose of this section is to define the GIS requirements for construction deliverables. This document is geared towards the GIS professional within an engineering or drafting firm. The requirements spelled out in this document will allow the CENME shop to document changes to the installation infrastructure. This document is for Laughlin AFB (LAFB) only.

All data submitted are Air Force Property and will be treated as “Controlled Unclassified Information” and protected against unauthorized transmission IAW DoDI 5210.83 and AFI 31-401.

After approval and acceptance by the Government, the Contractor shall submit the final data to the Government and remove the data from their records.

1.2 SPATIAL COORDINATE SYSTEM

LAFB requires all GIS and CAD data to be provided in the following coordinate systems.

1.2.1 XY Coordinate System

The XY coordinate system Laughlin AFB uses is UTM Zone 14N, WGS-1984 Datum, Units: Meters. Here are the specifics of this projection:

Projection: Transverse_Mercator

False_Easting: 500000.000000

False_Northing: 0.000000

Central_Meridian: -99.000000

Scale_Factor: 0.999600

Latitude_Of_Origin: 0.000000

Linear Unit: Meter (1.000000)

Geographic Coordinate System: GCS_WGS_1984

Angular Unit: Degree (0.017453292519943299)

Prime Meridian: Greenwich (0.000000000000000000)

Datum: D_WGS_1984

Spheroid: WGS_1984

Semimajor Axis: 6378137.000000000000000000

Semiminor Axis: 6356752.314245179300000000

Inverse Flattening: 298.257223563000030000

Laughlin will also accept NAD83 (WKID 2278)

Projection: Lambert Conformal Conic

False_Easting: 1968500.00000000

False_Northing: 13123333.33333333

Central_Meridian: -99.000000

Scale_Factor: 0.999600

Latitude_Of_Origin: 27.8333333333

Linear Unit: US Survey Foot (1.000000)

Geographic Coordinate System: NAD83 StatePlane Texas S Central FIPD 4204

Angular Unit: Degree (0.017453292519943299)

Prime Meridian: Greenwich (0.000000000000000000)

Datum: D_WGS_1984

Spheroid: WGS_1984

Semimajor Axis: 6378137.0

Semiminor Axis: 6356752.314140356

Inverse Flattening: 298.257222101

1.2.2 Geometry Properties

XY Resolution: 0.0001 Meter Z Resolution: 0.0001 Meter M Resolution: 0.0001 Meter

XY Tolerance: 0.001 Meter Z Tolerance: 0.001 Meter M Tolerance: 0.001 Meter

1.3 GIS DATA FORMAT

All Geographic Information Systems (GIS) data shall be stored in ESRI File Geodatabase (FGDB) format, Microsoft Access database format, or shapefile format.

All data submitted shall be formatted in accordance with the Air Force Adaptation of the Spatial Data Standard for Facilities, Infrastructure and Environment (SDSFIE), Subset 4.x.

All geospatial data shall be delivered in either the World Geodetic System of 1984 (WGS84) UTM Zone 14 North (metric) or NAD83 UTM Zone 14N (survey feet).

All (GIS) data shall be free of geometrical and topological errors such as slivers, undershoots, overshoots, dangles, overlaps, intersections, etc. GIS data delivered shall be topologically clean and tidy with lines and polygons snapped to adjacent features wherever appropriate.

All geodatabase deliverables shall be formatted to support Z (elevation) values.

All analog to digital conversion of data shall result in data that is geo-referenced to its associated supporting data.

The Contractor shall provide a quality control (QC) report that must state whether any inconsistencies in the data generated were corrected, or it must detail the remaining errors by case.

The Contractor shall collect Federal Geographic Data Committee (FGDC) compliant metadata on all digital geospatial data created under this contract in accordance with the Air Force Geospatial Data Layer Specification control document. All metadata deliverables shall reside within the geodatabase using the ArcGIS 10.x metadata template. Information on the FGDC's "Content Standards for Digital Geospatial Metadata" (CSDGM) is available from the Internet site at: <http://www.fgdc.gov/metadata/csdgm>.

2 SURVEYING

2.1 FIELD RECONNAISSANCE AND SURVEYING

All required surveying work shall make a complete survey of the project site recording existing topography, terrain features, location of existing equipment, location of all utilities above and below ground including its sizes and elevations; width of adjacent streets, pavements, sidewalks, curbs and ditches; locations of existing trees, hedges and other obstructions such as catch basins, manholes, utility poles and fire hydrants.

A survey of the project site may include topography, cross sections, drainage survey, bench level circuit, and/or soil boring data as required. A registered professional land surveyor shall be used where required by the Government. The Contractor shall use conventional surveying and other methods, such as a Total Stations or Global Positioning System (GPS) for field data collection.

2.2 SURVEY DATA REQUIREMENTS

A separate electronic data deliverable is required for utility information and shall be in a format that conforms to the latest version of both the CAD/GIS Technology Center's Spatial Data Standards and A&E/C CAD standards as well as PDF format. These standards can be found at [A/E/C Standards \(dren.mil\)](http://dren.mil). The 'As Designed' survey data shall be tied to LAFB's real world coordinates compatible with the base GeoBase initiative. All geodetic data delivered must contain spatial reference data that specifies the parameters of the coordinate system used.

Presentation of survey data shall be as follows: all line work, symbology, and topology shall be developed using the CAD/GIS Spatial Data Standards for Facilities, Infrastructure, and Environment and the Tri-Service Guidelines for Installation Mapping and Geospatial Data. The A&E shall deliver the final graphics in ESRI ArcGIS, AutoCAD, shapefile, Microsoft Access, or any other format pre-approved by Laughlin GeoBase.

Field data collection is required. The Contractor shall provide survey grade data at an accuracy level of $\pm 2\text{cm}$. The Contractor will make use of network features (utility lines, water networks, etc), and they shall be captured at a minimum of every 50 feet and each turn or bend in a utility must also be captured. Any control permanent or semi-permanent control points established by the contractor will be provided in an ESRI Shapefile format.

Verify and plot the location and size of the following utilities during the survey:

- Storm sewer lines, manholes, catch basins, and area inlets.
- Sanitary sewer lines and manholes.
- Water lines, valves, and fire hydrants.
- Power lines, power poles, and light poles.
- Gas lines and valves.
- Telecommunication lines, poles, risers, and any conduits
- Jet fuel lines, valves, and tanks.
- Underground/above-ground fuel tanks and piping.

Verify and plot the location and size of the following structures in the construction area during the survey:

- Building structures and fences.
- Streets, driveways, sidewalks, curbs, gutters, and signs.
- Trees (diameter and type), bushes, and stumps.
- Mechanical and electrical equipment items.

Identify on a map any storm sewer lines, manholes, catch basins, and area inlets that require repair, within the limits of the design.

Identify on a map any sunken curb and gutters, sidewalks and driveways, within the limits of the design. Show location and length of the sunken segment.

Identify on a map any open drainage ditch areas that are low or blocked causing water to stand, within the limits of the design.

2.3 ADDITIONAL REQUIREMENTS

Prior to beginning geographical surveying, the Contractor's surveyor shall meet with the 47 CES/CENME section. Reference points and benchmarks will be provided to the contractor.

All reference markers (such as PK nails) must be clearly marked with flagging or other Government approved methods.

3 AS-BUILTS DELIVERABLES REQUIREMENTS

3.1 PURPOSE & SCOPE

The purpose of this section is to define the CAD requirements for deliverables. This document is geared towards the CAD professional within an engineering or drafting firm. The requirements spelled out in this document will allow the 47 CES/CENME shop to incorporate changes to the as-built drawing vault more rapidly. This document is for Laughlin AFB (LAFB) only.

This instruction covers preparing high-quality as-built drawings. As-built drawings are an official record of the project at the time of construction completion. The original “as-designed” contract drawings and specifications are modified to show all additions, deletions and other changes made during construction, and will herein be referred to as Record Drawings or As-built. Accurate record drawings are very important for project operation and maintenance, and future modifications, particularly for plumbing and electrical systems, which are hidden from view.

All record drawings to include floor plans, site plans, structural plans, electrical plans, mechanical plans, etc, deliverables shall consist of all drawing files in .dwg as well as .pdf documents.

3.2 AS-BUILT DELIVERABLE FORMATS

The A&E shall prepare and furnish drawings to clearly indicate the extent, type, and detailed requirements for all work. Hardcopy drawings will be provided if specified in SOW and shall be prepared on an appropriate paper size, with layers conforming to A/E/C standards. Border width on the drawings shall be 20mm on binder side and 10mm on all other sides.

All Drawings are to be prepared in both 2D CAD and pdf formats unless otherwise specified in SOW. All CAD drawings shall be 100% compatible with Autodesk software. Printed documentation shall be furnished with each individual drawing file detailing layer usage, scale, x-ref file usage, layouts, and any plotting instructions required to produce a hard copy.

Final drawings shall be submitted digitally for approval on CD-ROM or via secure digital delivery methods. Hard copies may be required on a project-by-project basis.

3.3 DRAWINGS UNIT OF MEASURE

All CAD deliverables unit of measure will be in architectural feet and inches.

3.4 CAD AS-BUILT REQUIREMENTS FOR LAFB

The revisions from Contractor markups and field inspection notes should be transferred to the Final as-built set of drawings. The final as-built drawings include modifications during construction, field requested changes, shop drawing modifications, and contractor designs.

All drawing deliverables are required to follow the specific guidelines set in the A/E/C CAD Standards Release 6.0 [or later].

In addition to the A/E/C CAD standard, ensure the following drawing requirements are included:

- All as-built drawings are marked “As-Built” or “Record Drawing” in the title block or notes of the drawing.
- All font and plot files are included with the deliverable package.
- No blocks or external references are included in the deliverable package. If used, all must be packaged in the deliverable. One file, one complete drawing.
- The contents of the drawing excluding the title block are located in “model space” in AutoCAD. No drawing data will be accepted in paper / layout space.
- All deliverables are required to have a drawing index, and all corresponding drawings must match the referenced index.
- No tracked changes are to be included in the deliverables for 47 CES/CENME. Only the as-built or as-constructed data is required.
- No electronic as-builts or record drawings require the architect or engineer’s seal of approval; however, hard copy or pdf will require the seal of approval.

3.5 EXISTING RECORDS

Existing record drawings and information concerning the physical composition of the existing construction. The A&E shall be responsible for obtaining all drawings by emailing Laughlin GeoBase at laughlinmaps@us.af.mil.

Available as-built drawings have been archived by 47 CES/CENME in electronic format and hardcopy reproduction of the required drawings (or electronic copies) shall be provided upon request by 47 CES/CENME personnel. A&E shall field verify information provided by these drawings prior to their use in the design and prior to proposal submission.

Utility maps of the project site are available for use as reference. It is the responsibility of the A&E to verify accuracy of the description and location of the utilities in the field via visual observation, surveying, and potholing to the furthest feasible extent for any given project. Any disturbance of soil will require an approved Base Civil Engineer Work Clearance Request. This form can be obtained from 47 CES Customer Service, located in Building 100.

4 POINT OF CONTACT

For questions or additional information regarding this document, please contact the Laughlin AFB GeoBase Office at 830-298-4444.