



Deployed Airmen from the 635th Materiel Maintenance Squadron at Holloman AFB, N.M., connect two 3,000-gallon water bladders to a newly constructed laundry facility in the Dominican Republic as part of New Horizons 2017. The water bladders and laundry facility, along with virtually every other tangible asset on base, are among assets maintained by the U.S. Air Force Expeditionary GeoBase team. (U.S. Air Force photo by Staff Sgt. Timothy M. Young)

Utilizing GIS to support expeditionary bases throughout lifecycles

By AFCEC Geospatial Integration Office

Geospatial technologies and their wide array of applications provide invaluable resources to manage and address the complex tasks of site selection, construction, sustaining and closing U.S. Air Force installations within an overseas contingency environment.

The U.S. Air Force Expeditionary GeoBase team supports U.S. Air Forces Central, U.S. Air Forces Southern, and U.S. Air Forces Africa by providing contextual and situational awareness to areas of responsibility in 117 nations and territories. The team identifies and assists in the construction and maintenance of installation warfighting platforms to support active combat, peacekeeping, humanitarian, security, and contingency

operations. When the need for an installation has ended, Geospatial Engineers help provide the strategic framework that guides the process for shutting it down.

Different challenges arise during the lifecycle of an expeditionary base where AFCEC civil engineers have significant advantages due to today's geographic information system capabilities, and access to high-resolution orthoimagery and LiDAR (Light Detection and Ranging) data.

Site selection, sustainment and closures



The U.S. Air Force Expeditionary GeoBase team supports Airmen like Senior Airman Charles Ballou and Staff Sgt. Zacharia Blower, seen here at a well site in the village of Honduras Aguan near Trujillo, Honduras, in 2015. (U.S. Air Force photo by Capt. David J. Murphy)

Whether an installation requires setup to support wartime or humanitarian efforts, geospatial engineering is used to define the parameters and suitability of potential sites. Unlike the closure process, which can take years, selecting and opening an installation is done in weeks. The Expeditionary GeoBase team uses Geospatial Information & Services to quickly answer leadership questions that include, "What type of aircraft can be accommodated at the site? What's the distance to or from civilian populations, ground-zero disaster sites, or enemy capabilities? Is the site's topography appropriate for communications and weather-monitoring infrastructure? Is the location within an enemy's weapons range?"

Geospatial engineering capabilities and operational actions are invaluable force protection enablers that minimize the need for field crews to conduct on-site observations, measurements, and inspections within hostile environments. Geospatial Engineers safely provide expeditionary siting situational awareness within minutes rather than weeks with reliable and current geospatial databases.

The team uses the Geospatial Expeditionary Planning Tool software program, geospatial and Computer Aided Drafting software to assist in planning personnel deployment beddown and aircraft parking capacity. These embedded features enable expeditionary planners and engineers to isolate characteristics, such as building outlines and topography changes, to produce customized geographic map products for end-users.

Critical airfield length, width, and condition criteria are paramount. However increased focus on cultural, demographic, and political dynamics is needed to secure assets and Airmen during wartime or in emergency response situations. Potential site reviews are enhanced when making fully vetted site selections.

Once a site is selected, buildings, utilities, and all other infrastructure are under construction, and aircraft and personnel populate the installation, the challenge becomes maintaining assets and prioritizing tasks as mission requirements change. Just as an aircraft carrier's seaworthiness must be established, Air Force installations must be combat-ready. GeoBase enhances the development of maintenance schedules for aircraft, utilities, and critical assets. Geospatial Engineers are vital force enablers for personnel deployment and force protection requirements as mission objectives change in theater.

Expeditionary base closures can be a long, drawn-out process and require similar build-out and sustainment actions for asset accountability and misuse by adversaries. The process often involves equipment turnover, infrastructure, and records documentation to the host nation, or the expeditionary base is removed entirely and the area restored to original conditions. Air Force leaders rely on the AF GeoBase Program to provide a situational overview, which helps decision-makers create a systematic plan for shuttering a base. Who and what goes first are always mission dependent, but generally, expeditionary base closures start by collapsing the perimeters and evolve into knocking down walls and removing assets. Security forces are always the last to leave because their services are needed throughout the closure process.

UAS, augmented reality and other tech advances

Remote sensing capabilities have significantly increased in recent years. The value of LiDAR data and high-resolution orthoimagery provided by small aircraft flyovers and unmanned aircraft systems can't be overstated. While aerial satellite imagery can provide valuable information, the higher-resolution images from aircraft and UAS enable engineers to get a higher level of detail.

For example, orthoimagery can provide a clear image of an airfield or runway. Planners can see the severity of cracks in the pavement and how much rubber will need to be scraped off to make the runway safer. The color and condition of painted centerline markings are more visible. When evaluating a site for a potential installation, knowing these details can quickly save time and labor. Most importantly, orthoimagery gives leaders timely, precise, and relevant data to make informed decisions.

Planners use UAS with augmented reality tools to enable Airmen to map airfield damage after a theater ballistic attack while staying in a bunker. Drones can be launched autonomously and flown over construction zones to map progress and highlight deficiencies in real-time for the contracting agent. However, this autonomy cannot be achieved without the Geospatial Engineers behind the scenes who ensures the data is accurate. Well-managed geospatial databases and expert GeoBase engineers provide vital information to construct and maintain installation combat platforms. Planning with geospatial engineering saves time and money while protecting lives in theater. Expeditionary GeoBase actions offer a technological advantage to build, sustain, and

close expeditionary bases by analyzing and manipulating readily accessible geospatial resources.

For further information contact GeoBase at geobasesupport@di2e.net or visit us at <https://maps.af.mil/>

-30-

Photo captions

Expeditionary2.jpg: The U.S. Air Force Expeditionary GeoBase team supports Airmen like Senior Airman Charles Ballou and Staff Sgt. Zacharia Blower, seen here at a well site in the village of Honduras Aguan near Trujillo, Honduras, in 2015. (U.S. Air Force photo by Capt. David J. Murphy)

Expeditionary3.jpg: Airmen from the 823rd Expeditionary RED HORSE Squadron at Hurlburt Field, Florida, and U.S. Marines from the 271st Marine Wing Support Squadron, 2nd Marine Air Wing, at Marine Corps Air Station Cherry Point, North Carolina, lay brick in the second course at the Gabriela Mistral school in Ocotoes Alto, Honduras, in 2015. The USAF Expeditionary GeoBase team can track construction progress and collect clear aerial images that are put into Esri ArcGIS. (U.S. Air Force photo by Capt. David J. Murphy)

Expeditionary4.jpg: An F-16 Fighting Falcon assigned to the 480th Expeditionary Fighter Squadron lands at Al Dhafra Air Base, United Arab Emirates, in 2020. Determining whether an expeditionary base can accommodate F-16s and other aircraft is one of the many tasks of the U.S. Air Force Expeditionary GeoBase team. (U.S. Air Force photo by Senior Airman Bryan Guthrie)

Expeditionary5.jpg: An Airman assigned to the 332nd Air Expeditionary Wing waits for the arrival of two F-15E Strike Eagles at Al Dhafra Air Base, United Arab Emirates, in 2020. Air Force leaders rely on the USAF Expeditionary GeoBase team to determine what types of aircraft can be accommodated at an expeditionary installation. (U.S. Air Force photo by Senior Airman Bryan Guthrie)